VOL. IV., No. 2. JUNE, 1920.

PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

FOR THE YEAR 1919

HONOLULU, HAWAII
Price 50 Cents

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All correspondence should be addressed to the Secretary, Hawaiian Entomological Society, Honolulu, Hawaii, from whom copies of the Proceedings may be purchased.

Volume I of the Proceedings, for 1905-07 (in five numbers), contains 210 pages, 4 plates, and 5 text figures.

Volume II, 1908-12 (in five numbers), contains 311 pages, 7 plates, 5 cuts and 1 portrait.

Volume III, 1913-1917 (in five numbers), contains 500 pages, 8 plates and 6 cuts.

Volume IV, No. 1, 1918, contains 233 pages, 4 plates and 6 cuts.

Price per volume, $2.00. Price of any single number, 50 cents.

ERRATA.

The following typographical errors have been noted, and should be corrected in the text:

Page 250, line 19, for 'Maumua-' read 'Kaumua-'.

Page 266, bottom line, remove the *.

Page 291, bottom line, insert 'June' before '1920".

Page 301, second line from bottom, for 'cantaneus', read 'castaneus'.

Page 314, bottom line, insert 'June' before '1920'.

Page 315, second line from bottom, for 'dryer', read 'drier'.

Page 325, fifth line from bottom, for 'palnts', read 'plants.'

Page 326, bottom line, for '382', read '383'.

Page 329, fifth line from bottom, for 'speciment', read 'specimen'; and for 'Sept.,' read 'August.'

Page 353, line 31, insert a comma after *ferrugineus.*

Page 357, first line, for 'femore', read 'femora'.

Page 381, under the figure, for *'chrysomolbdoides',* read *'chrysomolybdoides'.*

Page 398, under the figure, for *'Siloan',* read *'Silaon'.*

Page 407, fourth line from bottom, for 'halves', read 'valves'.

Page 418, at top of page insert 'Plate VIII'.

Page 420, line 27, for 'femore', read 'femora'.

Page 423, at top of page insert 'Plate IX'.

Page 447, sixth line from bottom, for 'C', read 'D'.

Page 448, line 20, for *'(Limbatus)',* read *'(B. limbatus)'*; delete bottom line.

Page 449, line 4, for *'extranae',* read *'extranea'.*

PROCEEDINGS

OF THE

Hawaiian Entomological Society

Vol. IV, No. 2. For the Year 1919. June, 1920.

JANUARY 2nd, 1919.

The 160th meeting of the Society was held in the Entomological Laboratory of the Experiment Station of the Hawaiian Sugar Planters' Association, President Giffard in the chair. Other members present: Messrs. Bridwell, Crawford, Ehrhorn, Fullaway, Grinnell, Muir, Rosa, Swezey, Timberlake, Willard and Williams.

Minutes of previous meeting were read and approved.

Obituary.

Harold Oscar Marsh.

The October (1918) number of the *Journal of Economic Entomology* notes the death at Chester, N. J., Sept. 10, 1918, of H. O. Marsh, who was a member of this Society from October 6th, 1910, to February, 1911, at which time he returned to the mainland on account of ill-health.

According to the obituary notice in the *Journal*, Mr. Marsh was born November 6th, 1885, was educated in the public schools of Chester, N. J., and took a special course in entomology at the Kansas Agricultural College in 1914. His first employment was with the State Horticultural Boards in New Jersey and Pennsylvania. Later he joined the staff of the U. S. Bureau of Entomology. In the Bureau service he worked

mostly on truck crop insects in the South and West. While in Honolulu (July 1910 to February 1911) he was Assistant Entomologist at the Board of Agriculture and Forestry. His work in Hawaii was almost entirely practical, consisting of experiments with different spraying mixtures applied to the control of some of our field crops and vegetable pests. However, considerable biological work was carried on at the same time, and his accounts of the beet webworm and the imported cabbage webworm, published by the Bureau, are excellent in every way.

Publications on his work here are the following:

"Report of the Assistant Entomologist." Bienn. Rept. Bd. Agr. and For. Hawaii, pp. 152-159, 1910 (1911).

"Some Observations on the Crysanthemum Plant-Louse (*Macrosiphum solanifolii osborni* Gillette)." Bienn. Rept. Bd. Agr. and For. Hawaii, pp. 160-172, 1910 (1911).

"The Hawaiian Beet Webworm." Bul. 109, pt. I, Bur. Ent. U. S. Dept. Agr., Nov. 6, 1911.

"The Imported Cabbage Webworm." Bul. 109, pt. III, Bur. Ent. U. S. Dept. Agr., April 5, 1912.

While he has been gone from Hawaii for some years he is well remembered here by those with whom he was associated, especially on account of his cheerful disposition and keen interest in his profession.

D. T. Fullaway,
O. H. Swezey,
Committee.

Natural Control of Scale Insects in Hawaii.

BY DAVID T. FULLAWAY.

Mealybugs and scales are amongst our commonest insects, and together with their natural enemies have been the subject of investigation since the beginning of entomological work here. Indeed, the first practical work undertaken was a search for natural enemies of these destructive insects by Albert Koebele, the entomological explorer. Between 1891 and 1908 he made repeated consignments of Coccinellid beetles, parasitic Hymenoptera, etc., to Hawaii, some of which were able to multiply and spread; others failing. A record of this work was preserved in letters, reports, specimens, etc., but it is meagre in detail and faulty through misidentification of either enemy or host. The list of scale insect parasites and their hosts published by the writer in 1912 perpetuates many of the original errors and adds some new ones. Since that date, however, a thorough review of the subject has been made with Mr. P. H. Timberlake, who has a wide knowledge of the parasites and their relationships, and these errors have been corrected or eliminated as far as possible in the list which follows. There can scarcely be any doubt that many of the hymenopterous parasites were introduced here unintentionally with their hosts, before the days of horticultural inspection and quarantine, for there are few records of introductions, and Mr. Koebele states that he made little effort to secure them. On the other hand, the Coccinellid beetles were practically all introduced by Mr. Koebele or others, only four being known here previous to his time.

Scale Insect Parasites in 1912 Rpt. Haw. Exp. Sta. Errata.

p. 26 *Apentelicus* gen. nov.=*Microterys*. *Lepidosaphes* sp., given as the host of (*Apentelicus*) *M. kotinskyi* incorrect.

p. 27 *Odonaspis graminis*, given as the host of *Adelencyrtus odonaspidis*, should be *Odonaspis ruthae*.

Proc. Haw. Entom. Soc., IV, No. 2, June, 1920.

p. 28 l. 12 *Anagyrus* sp.=*Pauridia peregrina*. The host is *Pseudococcus kraunhiae*.

13 *Encyrtus fuscus*. *Infelix*, not *fuscus*. Vide Proc. Haw. Ent. Soc. III (5), p. 403.

14 *Encyrtus* sp. with banded antennae=*Anagyrus swezeyi*. *Saissetia* sp., given as the host, incorrect; should be *Trionymus insularis*.

17 *Blepyrus insularis*. *Mexicanus*, not *insularis*. *Pseudococcus virgatus* the only host. *P. aonidum* incorrectly reported. loc. cit.

19 *Aphycus* sp. Later described as *Aphycus terryi*. Not congeneric with *Aphycus*; transferred to *Pseudococcobius*. The host is *Pseudococcus saccharifolii*; *P. calceolariae* not now credited to the islands.

20 *Aphycus* sp. on *Lepidosaphes* sp. A misidentification of either parasite or host.

26 *Microterys* (*Apentelicus*) *kotinskyi* on *Lepidosaphes* sp., supra.

27 *Adelencyrtus odonaspidis* on *Odonaspis graminis*, supra.

28 *Cerapterocerus* sp. Two species are believed to be included under this name; one is probably *Anicetus annulatus*, reared from *S.hemispherica*, the other is supposed to be *Comperiella bifasciata*, reared from certain diaspine scales.

30 *Hemencyrtus* sp.= *Quaylea aliena*, a hyperparasite on *Saissetia nigra* through *Microterys kotinskyi* and *Scutellista cyanea*.

32 *Encyrtus* sp.=*Pauridia peregrina*. Supra.

p. 29 l. 2 *Aneristus ceroplastae* incorrectly determined; should be *Prococcophagus orientalis*, loc. cit., p. 404.

3 *Coccophagus orientalis* now *Prococcophagus orientalis,* supra. *Pseudococcus* sp., given as host, incorrectly reported.

5 *Coccophagus lecanii* on *Aspidiotus rapax.* The parasite is incorrectly determined; is probably a sp. of *Prospaltella.*

7 *Thysanus* sp. incorrectly determined; should be *Signiphora* sp. *Aspidiotus cydoniae* is the host; *Asterolecanium pustulans* incorrectly given.

9 *Aphelinus diaspidis.* Two species of *Aphelinus* are now recognized on scale insects, *A. fuscipennis* and *A. limonus.* What was determined as *A. diaspidis* is probably one or the other of these.

13 *Aphelinus* sp. (wingless) probably incorrectly determined; may be *Perissopterus* sp. *Lepidosaphes* sp., given as the host, a misidentification; should be *Pinnaspis buxi.*

14 *Pteroptrichoides perkinsi* on Coccid n.g. et sp. The host referred to is a diaspine scale on Bombay mango (supposed to be *Leucaspis indica*). The parasite has also been reared from *Morganella longispina.*

15 *Pteroptrichoides* sp. Later described as *Pseudopteroptrix imitatrix. Howardia biclavis* is the host; *Asterolecanium pustulans* incorrectly given.

24 records three parasites reared from *Asterolecanium pustulans.* It is believed the host was misidentified with respect to the two first. The last record is correct.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES.

Host	Parasite	Predator
Monophlebinae		
Icerya purchasi		*Novius cardinalis* (1)
Ortheziinae		
Orthezia insignis		*Hyperaspis jocosa* (2)
Dactylopiinae		See fn.
Asterolecanium pustulans	*Tomocera californica** + *Quaylea aliena**	
Antonina indica	*Perissopterus* spp. (2)* *Anagyrus antoninae**	
Eriococcus araucariae	*Aphycomorpha araucariae**	
Trionymus insularis	*Xanthoencyrtus apterus** *Anagyrus swezeyi** *Perissopterus spp.* (2)	*Scymnus ocellatus*°
Pseudococcus bromeliae		*Cryptolaemus montrouzieri* (3)
Pseudococcus kraunhiae	*Pauridia peregrina** *Tanaomastix abnormis** (4)	*Scymnus bipunctatus*

* Reared.
° Recorded but not confirmed.
fn. *Scymnus debilis* is a predator on dactylopiine species.
(1) Introduced 1890 from California.
(2) Introduced 1908 from Mexico.
(3) Introduced about 1894 from Australia.
(4) Introduced 1915 from California.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Pseudococcus filamentosus		*Scymnus bipunctatus* (5)
		Gitonides perspicax
		Cryptolaemus montrouzieri
Pseudococcus nipae		*Cryptolaemus montrouzieri*
		Rhizobius ventralis
Pseudococcus sacchari	*Tanaomastix abnormis* (6)	*Cryptolaemus montrouzieri*
		Aspergillus parasiticus
		Entomophthora pseudococci
Pseudococcus saccharifolii	*Xanthoencyrtus fullawayi**	
	*Pseudococcobius terryi**	
Pseudococcus straussiae	*Anagyrus* sp.*	
Pseudococcus virgatus	*Blepyrus mexicanus**	*Cryptolaemus montrouzieri*
	*Tanaomastix abnormis**	*Scymnus bipunctatus*
Coccinae		See fn.
Pulvinaria mammae	*Microterys kotinskyi*°	*Cryptolaemus montrouzieri*
Pulvinaria psidii	*Microterys kotinskyi**	*Cryptolaemus montrouzieri*
Pulvinaria urbicola	*Prococcophagus orientalis*°	

* Reared.

° Recorded but not confirmed.

fn. *Olla abdominalis* and *Azya lutipes* (introduced 1908 from Mexico) are predators on lecaniine species. Several fungus diseases of lecaniine scales were introduced in 1894; *vide* Koebele 1897 Rpt.

(5) Introduced 1895 from Japan. Reintroduced 1906 from S. China. Reintroduced 1914 from Philippine Islands.

(6) Reared by Swezey under artificial conditions.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Ceroplastes rubens	*Microterys kotinskyi**	
	Tomocera californica°	
	Tomocera ceroplastis (7)	
	Prococcophagus orientalis°	
Eucalymnatus tessalatus	*Anicetus annulatus**	
Coccus longulus	*Microterys kotinskyi**	
	*Aphycus alberti**	
	*Prococcophagus orientalis**	
Coccus viridis	*Microterys kotinskyi**	
	+*Quaylea aliena**	
	Coccophagus lecanii	
	Coccophagus ochraceus	
	Prococcophagus orientalis	
Saissetia hemispherica	*Scutellista cyanea** (9)	
	+*Quaylea aliena**	
	*Encyrtus infelix** (10)	
	*Encyrtus barbatus**	
	Anicetus annulatus° (11)	

* Reared.
° Recorded but not confirmed.
(7) Recorded by Perkins 1906 but not collected since.
(9) Introduced 1905 from California.
(10) Reintroduced 1915 from California.
(11) *Cerapterocerus* sp. recorded, is believed to be identical with *Anicetus*.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Saissetia nigra	*Encyrtus infelix**	
	*Encyrtus barbatus**	
	*Scutellista cyanea**	
	+*Quaylea aliena**	
	*Prococcophagus orientalis**	
	*Microterys kotinskyi**	
	Tomocera californica°	
Saissetia oleae	*Scutellista cyanea*	
	+ *Quaylea aliena*	
	Tomocera californica°	
Diaspinae	See fn.	
Howardia biclavis	*Pseudopteroptrix imitatrix**	
	Aphelinus fuscipennis?	
Diaspis bromeliae	*Aphelinus diaspidis*°	
	Aphelinus limonus (12)	
	Aspidiotiphagus citrinus (12)	

* Reared.

° Recorded but not confirmed.

(12) Recorded by Kotinsky with slide mount of parasite.

fn. *Sticholotis punctatus* (introduced from China and Japan 1895), *Pentilia nigra* (introduced from Japan 1895), *Cyreme nigellum* (introduced about 1894 from Australia) and *Chilocorus circumdatus* (introduced 1895 from S. China) are predators on diaspine scales. *Sphaerostilbe coccophila*, a fungus disease of diaspine scales, introduced from Florida 1899-1900.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Diaspis echinocacti	*Aphelinus fuscipennis* (13)	
	Aspidiotiphagus citrinus (14)	
Aulacaspis rosae	*Aphelinus diaspidis*°	
	Aspidiotiphagus citrinus (12)	
Phenacaspis eugeniae	*Aspidiotiphagus citrinus*	*Lindorus lopanthae*
Hemichionaspis minor	*Aphelinus limonus*	
(*rhododendri*)	*Aphelinus fuscipennis* (12)	
	Aspidiotiphagus citrinus	
Pinnaspis buxi	*Aphelinus* (wingless) (15)	
Aspidiotus cyanophylli	*Aphelinus limonus*	
	Aspidiotiphagus citrinus	
	Signiphora sp. (14)	
Aspidiotus cydoniae	*Signiphora* sp.	
	Aphelinus limonus (12)	
	Aphelinus fuscipennis (14)	

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* Reared.
° Recorded but not confirmed.
(12) Recorded by Kotinsky with slide mount of parasite.
(13) Reared by Ehrhorn and Fullaway. Recorded by latter as *diaspidis*.
(14) Recorded by Ehrhorn with slide mount of parasite.
(15) This may be a species of *Perissopterus*. *Perissopterus chinensis* introduced 1906 from S. China.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Aspidiotus rapax	*Prospaltella* sp.	
	Perissopterus sp. (12)	
	Pseudopteroptrix imitatrix (12)	
(sp.)	*Comperiella bifasciata* (12) (16)	
	Aphelinus sp. (12)	
Aspidiotus sp. on *Bombax ceiba*	*Comperiella bifasciata* (12) (16)	
Leucaspis indica	*Pteroptrichoides perkinsi* (12)	
Morganella longispina	*Pteroptrichoides perkinsi**	
	Prospaltella koebelei (17)	
Chrysomphalus aonidum	*Aspidiotiphagus citrinus**	
	Aphelinus fuscipennis?	
Chrysomphalus rossi	*Aphelinus limonus**	
Odonaspis ruthae	*Adelencyrtus odonaspidis**	
Lepidosaphes auriculata (*crotonis*)	*Aphelinus limonus* (12)	
	Aspidiotiphagus citrinus (12)	
Lepidosaphes beckii	*Aphelinus limonus*	*Lindorus lopanthae*
	Aspidiotiphagus citrinus	

* Reared.
° Recorded but not confirmed.
(12) Recorded by Kotinsky with slide mount of parasite.
(16) Introduced 1908 from Japan.
(17) Reared by Koebele.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Parlatoria ziziphus	*Aspidiotiphagus citrinus**	*Orcus chalybeus* (18)
Pseudoparlatoria giffardi	*Aspidiotiphagus citrinus* (12)	
	Aphelinus limonus (12)	

* Reared.
(12) Recorded by Kotinsky with slide mount of parasite.
(18) Introduced 1894 from Australia.

Scypophorus sp.—Mr. Muir exhibited a large black weevil captured December 17th, 1918, while crawling on a basement window of the Sugar Planters' Experiment Station. It was found to be a species near to *S. acupunctatus*, of which there are specimens in the Harford & Baron collection of American Coleoptera owned by Mr. W. M. Giffard. In regard to the habits of the weevils of this genus, one is known to live at the base of the yucca plant and another is injurious to sisal in Yucatan. It is the first record of the finding of anything of the kind here, and quite unexplainable how this single specimen could have made its arrival here.

Trionymus insularis and *Odonaspis ruthae*.—Mr. Ehrhorn recorded the finding of these two scales on *Eragrostis* from Koko Head, handed him by Mr. W. M. Giffard, December 16, 1918. He mentioned *Pseudococcus eragrostidis* as a third species known to occur on this grass.

Rhyncophorous larvae.—Mr. Ehrhorn exhibited a vial containing 122 larvae of a rhyncophorous beetle, found in quarantine inspection work in soil at the base of a Thuya plant from Japan.

Sinoxylon conigerum.—Mr. Swezey exhibited pieces of branches of the algaroba tree showing the work of the adults of this beetle. The specimens of wood were taken from a fallen tree that had been down about three weeks. In each instance a beetle had burrowed into the branch and cut away so much that it nearly severed the branch, very much as does the well-known tree-pruner in oak and hickory trees of America, so that they broke off very readily. The branches were one inch to an inch and a half in diameter.

Nesotocus giffardi.—Mr. Swezey exhibited pieces of branches of the *Cheirodendron* tree showing the characteristic pupal cells of this large weevil. They were collected in the forest on the ridge at Kuliouou, Dec. 22nd. No beetles were

found, nor larvae, but the presence of the pupal cells in the wood is taken as sufficient indication of the existence of the weevil in the forest at the extreme southeastern end of the Koolau Range. The beetle has hitherto been known only on Mt. Tantalus, Kaumuahona, Lanihuli and Palolo Valley. No doubt it will eventually be found to occur thruout the forests of this Island wherever its host plant occurs.

Mr. Crawford spoke at some length on three projects for universities of tropical agriculture.

FEBRUARY 6th, 1919.

The 161st meeting of the Society was held in the usual place. President Giffard in the chair. Other members present: Messrs. Bridwell, Crawford, Ehrhorn, Fullaway, Langford, Muir, Pemberton, Swezey, Timberlake and Williams.

Minutes of previous meeting read and approved.

NOTES AND EXHIBITIONS.

Halictidae.—Mr. Bridwell read the translation of a portion of de Walckenaers Memoires pour Servis à l'Histoire Naturelle des Abeilles solitaires, que composent le genre Halicte, published in 1817, on the habits of this family of bees.

Psychodid.—Mr. Bridwell reported finding a Psychodid fly very common now at Waikiki. It is black, and quite different from the Psychodid fly usually taken at light.

Apion sp.—Mr. Muir exhibited a specimen of this Curculionid found crawling up a slat on a fern house in Manoa Valley, January 26th, 1919. The species is near to but distinct from *Apion pennsylvanica,* judging from the description of that species. It is the first record of the finding of an *Apion* in Honolulu.

Psyllidae.—Mr. Crawford reported that the examination of a small collection of Hawaiian Psyllids referred to him by

Mr. Giffard, disclosed one new species of *Trioza* collected by Mr. Giffard at Kilauea, June 18, 1918, which he has described, also 34 additional specimens of *Trioza ohiacola* from Kilauea, 11 specimens of *Trioza hawaiiensis* and 3 specimens of *Kuwayama nigricapita.*

Cryptotermes sp.—Mr. Fullaway exhibited a small colony of this termite which contained a laying queen.

Vespid wasp nest.—Mr. Ehrhorn exhibited the nest of a Vespid wasp attached to an orchid leaf. It was found on a steamer from a South American port. The nest comprised six cells, built one on another, and all empty save one.

MARCH 6th, 1919.

The 162nd meeting of the Society was held in the usual place, President Giffard in the chair. Other members present: Messrs. Ehrhorn, Fullaway, Grinnell, Muir, Pemberton, Rosa, Swezey, Timberlake and Willard.

Minutes of previous meeting were read and approved.

The Committee on Revision of the By-laws reported, and the revision of by-laws which they offered was adopted as a whole, after being discussed article by article. By a provision of the old by-laws, it is subject to ratification at the following meeting.

The committee on the suppression of the ginger weevil reported that specimens had been sent to Washington for determination, and that Mr. Schwarz had expressed the opinion that they might be a variety of *Acalles lateralis,* or possibly a foreign *Acalles.*

PAPER.

Notes on Nesotocus Giffardi Perkins (Coleoptera).

BY JOHN COLBURN BRIDWELL.

The genus *Nesotocus* Perkins is one of the most isolated types of beetles present in the Islands. While placed in the Cossonidae by Dr. Perkins and associated with certain Central American weevils by Champion, it is clear that they have no close affinity with any of the Hawaiian Cossonidae and are perhaps to be considered as entirely isolated and not presenting certain affinities anywhere.

Dr. Perkins found the beetles of this genus associated with the Araliaceous tree *Cheirodendron* wherever they had been found and doubtfully reported them as attacking another similar tree.

The genus is composed of four closely allied species inhabiting Hawaii, Maui, Oahu and Kauai. The Oahu species *N. giffardi* has always been considered one of the rarer endemic insects, having only once been seen in numbers when Dr. C. M. Cooke, Jr., found numerous adults on Maumuahona peak in the Koolau Mts. in the early morning of May 1, 1914, running about actively over the trunk of a fallen tree. In my collecting in the Hawaiian Islands since 1913, it has been taken but once and then only a single specimen which, as it happens, was found upon the large-leaved *Suttonia* with *Proterhinus maurus*. At the head of Palolo Valley, trees have been seen repeatedly with dead branches, the trunk bored by the larvae but not until November 17, 1918, were we able to locate the beetle at work. Upon that date Dr Williams, Mr. Swezey and the writer were collecting upon the Castle Trail upon Kaumuahona when we found a tree of *Cheirodendron Gaudichaudii* which had fallen in a land slide and was heavily infested by the larvae of this weevil. This was in one of the little hanging valleys or coves where numbers of these trees—rather an unusual species in this part

of the mountains—were growing. This tree had fallen some time since and the eggs had evidently been laid soon after it had fallen. The tree, including the roots which were exposed, was about thirty feet in length with a diameter at the base of about nine inches. A rough estimate of the numbers of the larvae present indicated not less than three or four hundred larvae at work. These were in all stages from those very recently hatched to full grown ones and a few had already pupated.

The larvae during their feeding period work in the cambium layer of the bark and in some instances complete their transformations there, making their pupal cells between the bark and the wood. Ordinarily however upon reaching full growth they penetrate into the wood for ten or fifteen millimeters, nearly vertically and then direct the burrow along the grain of the wood and make a larval chamber there 20-35 millimeters long. When it is completed the larva plugs up the entrance with shredded wood and transforms with its head directed toward the opening and its beak folded against its breast. When it emerges the shredded wood is dragged back behind the weevil into its chamber.

A number of the full-fed larvae and the few pupae found were brought down in an effort to breed them out but with very indifferent success. Mr. Swezey found the larvae would construct pupal chambers in sugar-cane but in the warmer temperature of the lowlands they proved susceptible to molds and no satisfactory adults were secured. Long after the last of the pupae had made ineffectual efforts to transform and the larvae had molded or died in transformation, Mr. Swezey and I were able, on January 12, 1919, to return to this tree. To our surprise only a few of the grubs had reached maturity and none or but very few had emerged, while most of the larvae had become pupae. A considerable number of these were brought down and placed in a jar in damp moss and most of these transformed satisfactorily.

When these emerged it was not convenient to secure their natural food, so green branches of the cultivated *Nothopanax Guilfoylei* were placed in the jars with the living weevils. Some of these branches died and the bark in the damp moss became soft rotten like that in which the larvae had been originally found. Upon this the adults fed readily and also upon the tender soft green living bark of the growing tips. The adults were kept alive in this way for a month or more but no oviposition was observed.

Subsequently on the day the colony was found, the author found unmistakable pupal chambers of this species in the small dead branches of *Tetraplasandra oahuensis,* and on January 12, after securing our material from the original tree we continued along the Castle Trail coming down from Mount Olympus into Manoa Valley, studying the various Araliaceous trees encountered along the way. We were in this way able to make certain that this insect attacks the living trees of *Cheirodendron platyphyllum, C. Gaudichaudii, Pterotropia, Tetraplasandra oahuensis,* and *T. meiandra*—all the Araliaceous trees encountered.

The larvae were found in small branches dead at the tip and dying below, the young larvae living in apparently uninjured bark at the edge of the dying portion. Frequently in these smaller branches the larva, in making its pupal chamber, penetrates into the large pith cavities and transforms there.

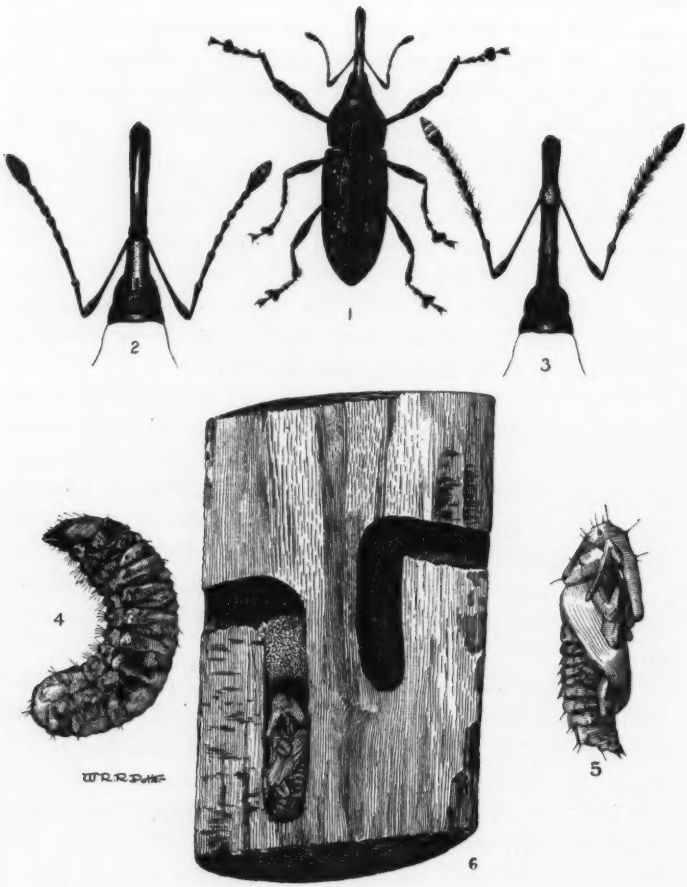
At various times the work of this weevil has been observed from Kuliouou at the extreme southeastern limits of its food plants in the Koolau mountains and as far northwest as Lanihuli, the peak on the northwest side of the Nuuanu Valley. Probably, since the weevil is a strong flyer, it extends over this island wherever its food plants are found. We have never found its work on the lowland *Reynoldsia,* all traces of its work having been found at elevations of about twelve hundred feet and above. There seems but little doubt

that this insect is occasionally instrumental in destroying its host tree. The habit of the adult in feeding both in decaying and sound bark would probably serve at times to inoculate the living tree with decay producing organisms. However, there seems to be no indication that it is producing any considerable injury, since the trees attacked are among the most vigorous species of trees in the native forests.

It is quite evident that the insect is not uncommon but on account of the scattered trees which it attacks it is only abundant in any one place when a fallen tree or dying tree permits the development in numbers; ordinarily it attacks only a branch here and a branch there, but our observation indicates that several of these branches might be found at almost any time if carefully searched for.

Plate VI shows views of portions of the trunk of a tree observed by Mr. Swezey along the Manoa Cliffs Trail on Tantalus. It was a standing trunk of a large *Cheirodendron Gaudichaudii* tree, from which the bark had fallen, exposing thousands of the openings of the pupal cells of this weevil. Evidence was not at hand to determine whether the weevil larvae had been the cause of the death of the tree, or whether their work was performed after the tree was dying from other causes.

The upper surface of the rostrum in the male is provided with tuberculate spines irregularly disposed behind the antennae and in an irregularly spaced series on either side in front; the rostrum is widened a little at the apex in the male but not in the female; in the male the antennae are inserted more than half way from the eyes to the tip of the beak, they are greatly elongate, the scape and flagellum each as long as the greatly elongate beak, and the joints of the funicle are provided with long loose hairs four or five times as long as the width of the joints; in the female the antennae are shorter, inserted about one-third the distance from the eyes to the apex and none of the hairs are longer than the width of a joint. The last tergite of the female is pectinate along its



Cheirodendron weevil—*Nesotocus giffardi.*

Fig. 1, Adult beetle. Fig. 2, Head and antennae of female. Fig. 3, Head and Antennae of male. Fig. 4. Larvae. Fig 5, Pupa. Fig. 6, Section thru branch of *Cheirodendron* tree showing pupal cells and one pupa in situ.

Photos of portions of the trunk of a dead *Cheirodendron* tree. The numerous round holes are the openings of pupal cells.

rounded posterior margin with about fifteen narrow teeth, while it is simple in the male. The legs, particularly the anterior pair, are more elongate in the male and the hind femora beneath toward the base have stout scale-like lance-linear hairs and the posterior tibiae beneath are serrulate and spinulose.

NOTES AND EXHIBITIONS.

Sarcophaga fuscicauda.—Mr. Timberlake stated that Dr. R. R. Parker had determined for him our unnamed species of *Sarcophaga* as *S. fuscicauda* Böttcher, described in Ent. Mitt. I (6) 1912, p. 168, fig. 5, from Formosa. It is not known how many years the species has been in Hawaii. The earliest specimen taken was by F. W. Terry in 1905.

Exochus femoralis.—Mr. Timberlake exhibited a specimen of this Ichneumonid captured on the window in the laboratory of the Experiment Station, H. S. P. A. Apparently this is as yet a rare immigrant, as only an occasional specimen has been taken.

Japyx sharpi.—Mr. Muir exhibited a live specimen of this rare Thysanuran, found in examining some soil from Kauai.

Hevaheva giffardi.—Mr. Swezey reported having collected large numbers of this Psyllid on *Platydesma campanulata* at Glenwood, Hawaii. There were no galls present on the leaves, nor could any young stages be found, so the habits of the young of this species could not be ascertained.

Megatrioza palmicola.—Mr. Swezey exhibited adults and young of the palm Psyllid collected on a native *Pritchardia* near Glenwood, Hawaii. The young live externally on the leaves, not in galls, and produce a large quantity of woolly wax.

Gracilaria hibiscella.—Mr. Swezey exhibited leaves of Hibiscus taken from hedges in Hilo, Hawaii, that were very much mined by this little Tineid. In many of the hedges there the infestation was so severe that the leaves were falling and leaving the hedge nearly bare. Many of the mines were found to contain parasites. Some were bred out.

Vanessa tammeamea.—Mr. Swezey reported having observed the Kamehameha butterfly in the yard of the Hilo Hotel. Some small *Pipturus* trees were found there, and on the leaves were small caterpillars of the butterfly. This is probably the nearest to sea level that it has been found breeding.

APRIL 3rd, 1919.

The 163rd meeting of the Society was held in the usual place, President Giffard in the chair. Other members present: Messrs. Bridwell, Crawford, Ehrhorn, Fullaway, Grinnell, Langford, Muir, Pemberton, Rosa, Swezey and Timberlake.

Minutes of previous meeting were read and approved.

The Revised By-laws as presented and discussed at the previous meeting were formally adopted.

Under a provision of the new By-laws, Messrs. F. Muir and E. M. Ehrhorn were elected to the Executive Committee.

Revised By-laws of the Hawaiian Entomological Society as Adopted April 3rd, 1919.

ARTICLE 1. NAME.

The name of this organization shall be THE HAWAIIAN ENTOMOLOGICAL SOCIETY.

ARTICLE 2. OBJECT.

The object of the Society shall be to promote the study of Entomology in all possible bearings, and to encourage friendly relations between those in any way interested in the science.

ARTICLE 3. MEMBERS.

The Society shall consist of *Active, Corresponding* and *Honorary* members. No *Corresponding* members shall be elected from residents on the Island of Oahu.

Election of members shall be by ballot, nomination having been made by a member of the Society at a previous meeting.

A majority vote of active members present shall be necessary for election.

The annual dues for Active Members shall be five dollars and for Corresponding Members two dollars; Active Members absent from the Territory for twelve consecutive months or more to be considered as Corresponding Members. Honorary Members shall be exempt from dues.

Any member in arrears for one year may, after due notification be dropped from the rolls. No member in arrears shall be entitled to a vote or to the Proceedings of the Society for that year.

Article 4. Officers.

The officers of the Society shall be a President, a Vice-President and a Secretary-Treasurer to be elected by ballot at the annual meeting. These officers, together with two active members to be elected by the Society in the same manner as the Officers, to form an Executive Committee.

Article 5. Duties of Officers.

(a) The duty of the President shall be to preside at the meetings of the Society and Committees, and regulate all the discussions and proceedings therein, and to execute or see to the execution of the By-Laws. In case of an equality of Vote the President shall have a double or casting Vote.

It shall be the duty of the President to deliver an address at the closing meeting of the year.

(b) In the absence of the President the Vice-President shall fill his place, and shall for the time being have all the authority, power and privilege of President.

(c) In the absence of the President and Vice-President a chairman pro tem may be elected by a majority Vote of the Active Members present.

(d) The Secretary-Treasurer shall conduct all the correspondence of the Society, keep a list of members, give due notices of all meetings and take and preserve correct minutes

of the Proceedings of the Society; he shall have charge of all moneys of the Society, collect all dues, assessments, receipts and contributions, make disbursements under the direction of the Executive Committee, and submit a report of the state of finances of the Society at the annual meeting or whenever called for.

(e) The Executive Committee shall appoint one or more active members from among themselves or otherwise to take care of the Library and Collections and to edit the Proceedings.

The Librarian and Curator shall have custody of the Library and Collections, and shall manage them under the direction of the Executive Committee.

The Editor's duties shall be those usually pertaining to the office.

Article 6. Meetings.

The regular meetings shall be held, unless otherwise ordered by the Executive Committee, on the first Thursday of each month. The annual meeting for the election of officers shall be the regular meeting for the month of December. Special meetings may be called by the Executive Committee, or by the President at the written request of five Active Members. Five members shall constitute a quorum for the transaction of business.

Article 7. Amendment.

These By-Laws may be amended at any regular meeting by a two-thirds vote of the active members present, a copy of each amendment proposed having been presented at the preceding regular meeting.

Article 8. Order of Business.

(a) Reading and approval of minutes.
(b) Reports of officers and committees.
(c) Nomination and election of members.
(d) Nomination and election of officers at annual meetings.

(e) Unfinished and new business.
(f) Presidential address at annual meeting.
(g) Reading of papers on local subjects.
(h) Reading of papers on foreign subjects.
(i) Exhibitions and discussions of local material.
(j) Exhibition and discussion of foreign material.

PAPERS.

A New Species of Fruitfly Parasite from Java (Hymenoptera).

BY D. T. FULLAWAY.

Biosteres javanus n. sp.

♀ 4 mm. long; head and thorax ochraceous; closely punctate, rather coarsely on the head, and clothed with silvery hairs; abdomen yellowish brown, impunctate; legs, mandibles and palpi luteous; antennae fuscous brown, vertex of the head and valves of the ovipositor fuscous. Head transverse, more than twice as wide as long, wide between the eyes, which are convex; ocelli arranged in an equilateral triangle on the vertex, the field being elevated and smooth with a circumferential groove, posterior ocelli almost vertical, ocelli to the eye nearly twice the distance from ocellus to ocellus; antennae fairly close together, further removed from the eye than from each other, the sockets deep with elevated rims, 40-segmented, the scape and pedicel stout, the flagellum filamentous; face convex, subcarinate, wider than long, receding below, clypeal fossae deep; cheeks fairly wide, mandibles stout, curved and apically toothed. Thorax robust, nearly as wide as the head and deeper than wide, mesothoracic scutum with parapsidal grooves very deep, converging and provided with large fossae; two slight submedian depressions anteriorly; prescutellar sulcus with 4 deep fossae; scutellum triangular; metanotum carinate in the middle and fossulate at the sides with an anterior and posterior smooth transverse band; propodeum irregularly areolate and somewhat rugose, stigmata small and round. Mesopleurae with a deep and fossulated sulcus. Abdomen ovate, somewhat compressed apically, 1st and 2nd tergites longitudinally striate and separated by a deep sulcus, 1st tergite longitudinally bicarinate, the sides also strongly margined; following tergites smooth and shining with a transverse line of fine silvery hairs close to the posterior border; ovipositor exserted and longer than the abdomen. Legs rather slender. Wings hyaline, veins fuscous, radius in anterior wing arising at about the middle of the stigma, which is lanceolate, second abscissa somewhat shorter than the 1st transverse cubitus.

♂ 3.5 mm. long, black, the face, orbits of the eye and antennae basally reddish brown to testaceous, legs, mandibles, palpi and sternites of the abdomen (extending on to the tergite of the 2nd segment laterally and the posterior margin of the following segments) luteous.

Described from 19 females and 7 males (type, allotype and paratypes), reared at Buitenzorg, Java, from pupae of *Dacus ferrugineus* in fruits of *Capsicum*, by P. van der Goot, 10.8.18. Types in collection H. S. P. A. Exp. Sta., Honolulu.

A New Species of Immigrant Termite from the Hawaiian Islands.

BY MASAMITSU OSHIMA.
Of the Institute of Science, Government of Formosa.

In the following is given the record of an immigrant termite, which first appeared in Honolulu in 1913 and has succeeded in becoming firmly established there. Specimens were forwarded to me by Mr. D. T. Fullaway, Entomologist of the Hawaiian Board of Agriculture and Forestry. According to his information, it is doing considerable damage in the city of Honolulu, completely honeycombing wood-products and woodwork. It does not build mounds like many tropical species, but makes its nest in or near the ground, using a considerable amount of soil; it forms very large colonies; it builds covered passage-ways when it comes to the surface.

No doubt these are characteristic of the termites grouped in the genus *Coptotermes*, most formidable pests in wooden structures. After examining the specimens, I came to the conclusion that the present species is new to science, related very closely, however, to *Coptotermes formosanus* Shiraki, from Japan and Formosa. Up to the present, there is no record with regard to the occurrence of *Coptotermes* in the Hawaiian Islands. Therefore, it is reasonable to believe that it has been introduced from South America or the Orient, as suggested by Mr. Fullaway.

Here I express my hearty thanks to Mr. Fullaway, by whose courtesy I was able to examine these interesting specimens.

Coptotermes intrudens n. sp.

Imago:—Body reddish brown, head somewhat darker; clypeus, antennae, legs and ventral surface of abdomen yellowish brown; wings hyaline, with yellowish costal margin. Head sparingly provided with minute hairs; thoracic plates almost smooth, with a small number of hairs; wing-stumps hairy; abdominal tergites densely covered with delicate hairs.

Head round, fontanelle indistinct; post-clypeus very short, its anterior border wavy; ante-clypeus exceedingly longer than the former, obtusely pointed anteriorly; eyes prominent; ocelli oval, the distance to eye is less than half its longer diameter; labrum tongue-shaped, entirely covering the mandibles; antennae 15-jointed (broken), basal joint cylindrical, 2nd squarish, slightly longer than 3rd, 4th joint shorter than 3rd; pronotum subreniform, the middle of the posterior border more strongly indented than that of the anterior; mesonotum and metanotum slightly narrower than pronotum, their posterior borders weakly emarginate at middle; anterior wing-stumps much larger than the posterior, covering the base of the latter; median nerve of the anterior wing runs nearer to cubitus than radius, furcating at the tip; cubitus with ca. 8 branches, of which the proximal ones stronger; cubitus of the posterior wing with ca. 9 branches.

Length of body	7.00 mm.
Length of head	1.31 mm.
Width of head	1.38 mm.
Width of pronotum	1.40 mm.
Length of pronotum	0.91 mm.
Length of anterior wing	11.00 mm.

Soldier:—Head yellow; mandibles dark brown; antennae and labial palpi yellowish; abdomen straw-colored. Head and pronotum sparingly pilose; mesonotum, metanotum and abdominal tergites densely provided with hairs.

Head suborbicular, fontanelle distinct, its orifice directed forward; ante-clypeus short, trapezoidal, post-clypeus not separated from forehead; labrum lancet-shaped, the tip hyaline and sharply pointed, scarcely reaching the middle of the mandible; mandible sabre-shaped, with strongly incurved, piercing tip, the cutting margin smooth; antennae 15-17 jointed, basal joint cylindrical, 2nd joint quadrate, longer than 3rd, 3rd joint smallest, slightly shorter than 4th; gula gradually widening anteriorly and converging at the tip; pronotum narrower than head, anterior and posterior borders distinctly bilobed, sides slightly converging posteriorly; mesonotum and metanotum nearly as broad as pronotum.

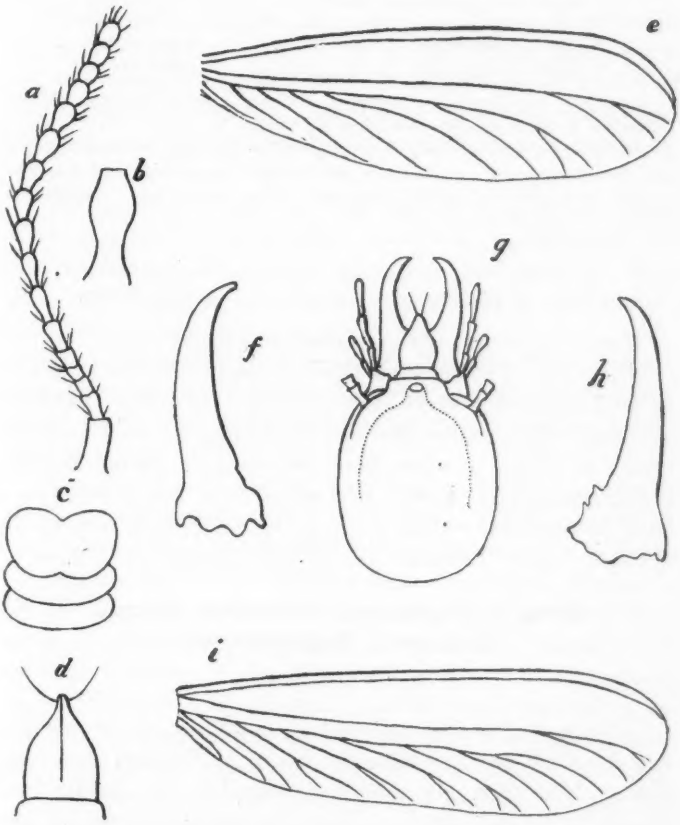


PLATE VII: *Coptotermes intrudens.*

a. Antennae of the soldier. *b*. gula of the soldier. *c*. Thorax of the soldier. *d*. Labrum of the soldier. *e*. Anterior wing of the imago. *f*. Left mandible of the soldier. *g*. Head of the soldier. *h*. Right mandible of the soldier. *i*. Posterior wing of the imago.

Length of body	5.00-5.50 mm.
Length of head with mandibles	2.50-2.63 mm.
Length of head without mandibles	1.63 mm.
Width of head	1.25-1.31 mm.
Width of pronotum	0.90-0.97 mm.
Length of pronotum	0.56-0.63 mm.

Worker: Head yellow; abdomen whitish. Head sparingly pilose; abdominal tergites densely covered with hairs.

Antennae 15-jointed, basal joint cylindrical, 2nd nearly as long as 3rd and 4th taken together; pronotum subreniform, its anterior and posterior borders indented at middle, narrower than mesonotum; metanotum broader than mesonotum.

Length of head	4.00 mm.
Width of head	1.28 mm.
Width of pronotum	0.81 mm.

Hab.: Honolulu, Oahu, Hawaiian Islands.

Remarks: The nearest relative of the present species seems to be *Coptotermes formosanus* Shiraki, from the Island of Formosa, which causes most serious damage to wooden structures. It differs, however, from the latter in having the following characters: Imago is provided with larger pronotum; head of the soldier does not converge anteriorly, measuring 1.25-1.31mm. × 1.63mm., instead of 1.18mm. × 1.56mm.

Notes on Callithmysus microgaster (Sharp). (Coleoptera, Plagithmysides).

BY O. H. SWEZEY.

This beetle was first collected by Blackburn (3 specimens), and described as a *Clytarlus* by Sharp in Tr. Ent. Soc. London, p. 103, 1879. It is next mentioned in Tr. Dublin Soc. (2), III, p. 261, 1885. "Rare, in decaying wood on the mountains near Honolulu, at an elevation of 2000 feet. June". (Blackburn). It is figured in the same publication. (Pl. V, fig. 46).

In Fauna Hawaiiensis, II, p. 113, 1900, Sharp places it in the genus *Callithmysus,* and adds var. *hirtipes*(?) based on "One individual on the ridge leading from the head of Pauoa

Valley to the peak called Konahuanui, Oct. 31, 1892. On *Bobea* sp." (Perkins).

Sharp again mentions the species in Fauna Hawaiiensis, III, p. 649, 1910. "Oahu, N. W. Koolau Range, April, 1901, two specimens (Perkins). Only six individuals are known of *Callithmysus microgaster*. They come, I believe, from three different spots on Oahu, and seem to indicate the probable existence of local races."

Perkins in his paper on "The Insects of Tantalus", Proc. Haw. Ent. Soc., I, p. 45, 1906, states that *C. microgaster* occurs on *Bobea*. He says, "I have taken *microgaster* in May, June and November. The larvae I have taken in numbers but the beetles rarely and singly".

At the September 1913 meeting of the Hawaiian Entomological Society, Mr. Giffard exhibited a specimen of *C. microgaster* which had been given him by Mr. Koebele. (Proc. Haw. Ent. Soc., III, p. 14, 1914).

Recently, I have had the good fortune to rear a specimen of this beautiful beetle. In a fallen tree of *Perrottetia sandwicensis* blocking the Cooke Trail a little below the Pauoa Flats, on January 12, 1919, I found several Cerambycid larvae. I cut out a section of the tree about ten inches long and three inches in diameter, containing a larva which seemed to be nearly full-grown. I placed this in a glass jar in the laboratory at the Experiment Station, and had an occasional look to see how the larva was getting on. It continued eating and migrating round in the outer layer of wood just beneath the bark. On February 19, it was found to have burrowed deeper into the wood; and on March 25, a fine adult beetle was found moving about in the jar. From Dr. Sharp's characterization of the variety, this would be var. *hirtipes*. This is not far from where Dr. Perkins collected his specimen of *hirtipes* on *Bobea*.

NOTES AND EXHIBITIONS.

Cremastus hymeniae.—Mr. Swezey recorded this parasite from Hawaii for the first time. He reared it from the banana

leaf-roller (*Omiodes meyricki*) taken at Mountain View.

Amblyteles koebelei.—Mr. Bridwell exhibited specimens of this Ichneumonid and stated that from material collected on Maui, he could distinguish a second species. Unfortunately, only males have been collected up to the present. It is a dark-winged form without black bands on the abdomen. The form described by Swezey as *Ichneumon koebelei* is also dark-winged, but only in the opposite sex, its male being a very light form with light wings. Mr. Timberlake stated that the form is congeneric with *Amblyteles* species, and not so with forms now called *Ichneumon.*

*Mimulapis versatilis.**—Mr. Bridwell exhibited the type series of this bee and also some other bees with very diverse characters, all of which had at some time or other been included in the genus *Prosopis.*

New Anthomyid.—Mr. Timberlake exhibited an Anthomyid fly captured recently in Honolulu on Lunalilo St. near Victoria. It is an immigrant not previously collected. It is light gray and has a transverse black band across the thorax.

MAY 1st, 1919.

The 164th meeting of the Society was held in the usual place, with Vice-President Crawford in the chair. Other members present: Messrs. Bridwell, Fullaway, Muir, Pemberton, Rosa, Swezey, Timberlake and Willard.

Minutes of previous meeting were read and approved.

PAPERS.

Notes on the Immigrant Hawaiian Species of Ichneumonini or Pimplini of Authors (Hymenoptera).

BY P. H. TIMBERLAKE.

As there seems to be some misunderstanding concerning the identity of the *Pimpla hawaiiensis* of Cameron, the writer

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*Proc. Haw. Ent. Soc., IV, No. 1, p. 163, 1919.

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*Proc. Haw. Ent. Soc., IV, No. 2, June, 1920.

has thought it wise to redescribe the species with a review of the host records. In accordance with a recent paper by Cushman and Rohwer* the species must be placed in the genus *Ephialtes* Schrank. A species that is best referred to *Itoplectis* is also brought forward as new.

Ephialtes hawaiiensis (Cameron).

Pimpla hawaiiensis Cameron, Mem. Manchester Lit. & Phil. Soc., 10 (3rd Ser.), 1886, p. 239, ♂.

Pimpla hawaiiensis Ashmead, Fauna Hawaiiensis, 1, pt. 3, 1901, p. 339, ♀, ♂.

Pimpla hawaiiensis Swezey, Ent. Bull., 5, Exper. Stat., H. S. P. A., 1907, p. 42, pl. 5, fig. 5, ♀, ♂.

Pimpla turionellae Morley, Rev. Ichn., 3, 1914, p. 60, 66, (in part).

There seems to be considerable confusion in regard to this species, probably arising from the fact that Ashmead failed to describe the female correctly. That the hind legs are entirely red in the female was not brought out, Ashmead merely adding to Cameron's description of the male, which was copied ver batim with one slight omission, the length, and the statement that the ovipositor is less than one-half the abdomen. This may account for Perkins believing that there is a second "commonplace *Pimpla*" in the Islands†, a record which I cannot accept as all the local collections show but this one species and the new *Itoplectis* described below. Morley has synonymized *hawaiiensis* with *Ephialtes turionellae* (Linné) after examining Cameron's type male. While there seems to be no reason to dispute Morley's decision that the male of this species is quite typical of *turionellae*, this in itself even if entirely true is not sufficient grounds for synonymizing the species, since two species as in the present case may be quite or nearly identical in one sex and as clearly distinct in the other.

Hawaiiensis is probably an immigrant from some part of America and Perkins considered that he had seen the same

* Proc. Entom. Soc. Washington, 20, Apr., 1919, pp. 186-188.
† Fauna Hawaiiensis, 2, pt. 6, 1910, p. 676.

species from Mexico. In the entirely red legs of the female and oval propodeal spiracles it is close to *Ephialtes punicipes* (Cresson) recorded from Mexico and Central America, but differs according to the characters given *punicipes* by Morley (Rev. Ichn. 3, 1914, pp. 59, 63) in having no carinae on the propodeum and no trace of areas, and in the male in having the hind tibiae and tarsi black with a white annulus on the basal half of the tibiae.

♀.—Shining black; the legs nearly morocco red (Ridgway), the front coxae blackish at base, the front legs often with a somewhat yellowish cast especially on the tibiae and tarsi, the hind tibiae slightly more brownish although rarely distinctly so, the hind tarsi still more brownish on the upper side, the last joint becoming fuscous at apex, all the claws blackish at apex, the femoro-trochanter articulation sometimes blackish; palpi yellowish brown, becoming fuscous on the basal joints; antennae brown, the flagellum shading into fuscous on the apical half, the scape black; the line marking the upper limits of the clypeal impression often more or less reddish brown especially at the sides; tegulae fuscous, becoming yellowish at base; spicula of ovipositor dark castaneous, the sheaths black; wings somewhat fuliginous, the veins and stigma mostly fuscous or blackish, the latter yellowish at base and the costal vein more or less yellowish on its basal half.

Head transverse, no wider than the thorax; the temples short, oblique; the eyes slightly emarginate internally; the frons deeply excavated to form the scrobes, with a slight median carina forking in front of the ocelli; face a little wider than long, convex, slightly protuberant medianly, with a slight indication of a median carina above; cheeks long; clypeus at apex truncate with a slight median emargination; antennae slender, perfectly filiform, the flagellum with 27 to 30 joints. Face and base of clypeus finely, rather closely punctate; the cheeks, temples, vertex and occiput comparatively impunctate, smooth and shining; the frons very finely punctate, the scrobes sometimes transversely aciculate in large specimens, but usually smooth in small specimens. Face with a moderately long, rather abundant yellowish pubescence, which becomes longer on the base of the clypeus and on the mandibles.

Notauli absent; the epicnemia bent forward on the pleura in a broad curve but rather widely separated from the propleura at either end; the propodeum without areas, only the pleural carinae being present, the spiracles rather small and oval. Propleura transversely aciculate except above; the mesoscutum and scutellum appearing impunctate under low magnification, but actually with very minute, rather close punctures, which become somewhat larger and very crowded on the anterior part of the scutum; mesopleura with a similar but somewhat more distinct puncturation above, becoming coarser and much closer below and on

the sternum, the prepectus, however, finely rugose; propodeum rugosely punctate becoming coarsely rugose dorsad, the petiolar region smooth, shining and limited above by transverse cariniform rugosities; the metapleura finely rugoso-punctate. Mesonotum with a much finer, shorter pubescence than on the face; that on the mesopleura a little longer than on the scutum and that on the propodeum as long and dense as on the face.

Abdomen about a third longer than the head and thorax; basal tergite slightly longer than its apical width, its basal half flattened, not or hardly excavated medianly, forming an obtuse angle with the apical, transverse part; the following tergites transverse, the second longest, the rest gradually shortening, the third and fourth widest; the second to fourth wtih a slight transverse impression on each side half way between the middle and apex, a longitudinal furrow on each side close to the lateral margin and a somewhat oblique furrow on either side on basal half just within the spiracles, the intervening area between these sulci forming a spiracular protuberance, which is smooth and shining with the spiracle located at its apical end, and forming a distinct although small emargination on the sides of the second and third tergites in dorsal aspect; apical margin of the first five tergites slightly elevated and impunctate, the basal half of the first, the basal margin of the second together with the three apical tergites also impunctate, smooth and shining, with a delicate reticulate surface sculpture except at base of first two segments; apical half of the first and the four following tergites otherwise densely, moderately coarsely punctate with round punctures, and hardly at all tuberculate either before or behind the transverse impression; the last tergite with two fine impressed lines meeting in an acute angle at the middle of the basal margin, the enclosed triangular area having the surface sculpture finer and smoother; pubescence rather conspicuous on the venter and wide epipleura, on the sides of the apical tergites and on the apical margin of the eighth tergite; the basal and middle tergites with an extremely fine or microscopic pubescence; ovipositor about one-half as long as the abdomen, its sheaths finely, densely pubescent.

Legs of the usual type, the front tibiae dorsally thickened at the middle and then somewhat rapidly constricted towards the apex; last joint of the tarsi about thrice as long as the fourth; the claws simple although greatly widened at base. Areolet of wings sessile, quadrangular, the transverse vein emitted beyond its middle; the discocubital vein slightly arcuate, usually not broken; apical abscissa of radius straight; nervulus a little postfurcal or sometimes interstitial; nervellus of hind wings broken somewhat more than half way above its middle.

Length: About 5 to 10 mm., smaller specimens being most abundant.

♂.—Similar to female, the antennae rarely brown, usually entirely fuscous or blackish; the hind tibiae and tarsi black, with the tibial spurs and a band from the middle half way to the base of the tibiae pale yellowish or white; the middle tibiae with a similar pattern, but the dark

parts much diluted or brownish and restricted to the dorsal side; apex of the last joint of the front and middle tarsi with their claws blackish.

Eyes less emarginate, the face more distinctly protuberant; antennae much stouter with the flagellum slightly attenuated towards the apex and composed of 26 to 29 joints. Abdomen about a half longer than the head and thorax, slenderer; the basal tergite about a half longer than wide, hardly narrowed at base, its basal part distinctly excavated and shorter than the apical portion, which is about as long as wide or a little longer; second tergite about as long as wide, or sometimes slightly longer than wide, the four following tergites about equally long and all transverse; the seventh tergite narrowed towards apex and about as long as its apical width; the eighth small and often retracted or concealed within the seventh, divided into two lobes by an oblique angulated suture down the middle, the left lobe overlapping the right, the cerci short and rather stout, situated on either side of the truncate apex; eighth ventrite triangular with the apex rounded, stipites (or valvulae) of the genitalia black, covered externally with a fine, white, moderately thick pubescence, somewhat over twice as long as wide at base, tapering to the rounded apex (sometimes appearing very acute at apex if folded in drying); sagittae united with a median suture evident, ligulate, about four times as long as wide at base, tapering very gradually to the rounded apex, apically curved downward and testaceous in color.

Sculpture for the most part much finer than in the female, especially on the propodeum and abdomen; the propodeum almost always with the transverse wrinkles on the disk much reduced or entirely absent especially in smaller specimens, the smooth area of the petiolar region then extending forward narrowly to the base; abdomen finely, closely punctate, with the puncturation finer on the apical tergites, being still distinct on the sixth, much less so on the seventh and absent on the eighth; apical margin of the first six tergites distinctly elevated and impunctate, and like the smoother parts of the following tergites very finely reticulate; the basal excavation of the first tergite smooth, shining and not reticulate.

Pubescence on the whole more abundant and prominent than in the female, being especially long and prominent on the sides of the propodeum; the tergites of abdomen except the eighth all rather densely pubescent with fine, short, white hair.

Length: 4 to 8 mm.

This species has been recorded from Hawaii, Lanai, Maui, Molokai and Oahu by Ashmead and also occurs on Kauai, where it has been collected by Terry, Swezey, Kusche and the writer. It is found at all elevations, but apparently it is quite as common if not more so in the lowlands, and is often abundant in Honolulu.

It was recorded by Kirkaldy (Hawaiian Forester & Agriculturist, 1, 1904, p. 209) as a parasite of *Omiodes accepta* Butler, and of several unspecified Tineids and Tortricids from Perkins' rearings. Perkins (Proc. Haw. Ent. Soc. 1, 1906, p. 44) recorded it with other parasites from *Omiodes, Agrotis, Vanessa* and *Scotorythra,* so that some of these records almost certainly do not apply to this species. Swezey in 1907 (Ent. Bull., 5, Exper. Stat. H. S. P. A., p. 43) recorded it from Perkins' rearings as a parasite of *Omiodes accepta* and *O. blackburni* Butler, *Azinis hilarella* now known to be *Ethmia colonella* Walsingham, and two species of *Cacoecia,* at present known as *Archips postvittanus* (Walker) and *Amorbia emigratella* Busck. In 1915 Swezey (Proc. Haw. Ent. Soc., 3, p. 105) recorded it from the following additional hosts: *Cryptoblabes aliena* Swezey, *Euhyposmocoma ekaha* Swezey, *Cryptophlebia illepida* (Butler), *Pectinophora gossypiella* (Saunders) and *Hyposmocoma liturata* Walsingham. More recently Mr. Bridwell has reared it from *Cryptophlebia vulpes* Walsingham as well as from *C. illepida.*

It always issues from the pupae of its hosts, and pupates nearly nakedly within the empty pupal shell, as the larva does not spin a definite cocoon although it does line the shell with a comparatively small amount of silk.

Itoplectis immigrans n. sp.

A rather shining black species, with the first five segments of abdomen ferruginous, which in the non-emarginate clypeus, the deeply emarginate eyes, somewhat attenuated antennae, short cheeks, the simple claws of the middle and hind tarsi, obsolete notauli, rather small oval spiracles, and nervellus broken far above the middle agrees with *Itoplectis,* although the pubescence is neither especially long nor recumbent, and the front claws are also simple. The peculiar coarse and rugose sculpture of the abdomen is similar to that of certain species of *Hemipimpla.*

♀.—Head, mandibles, thorax and apex of abdomen rather shining black; the first five tergites of abdomen and sides of the sixth nearly

burnt sienna (Ridgway); palpi yellow; antennae pale brown with the scape and the articulations of the flagellum especially towards its base blackish; legs nearly concolorous with the base of abdomen, the front and middle coxae sometimes yellowish; basal half of the front and middle tibiae and the tarsi strongly yellowish, the apex of the last joint of the middle tarsi and especially of the hind tarsi blackish, of the front tarsi hardly darker; knee-joint of hind legs and apical fourth of the hind tibiae black; rest of the hind tibiae yellow, shading into ferruginous beyond the middle; tegulae and sometimes a small dot on the posterior dorsal corners of the propleura yellowish; ovipositor black, the spicula dark reddish brown; wings subhyaline, the veins mostly fuscous with the radix, costal vein, base of subcostal and base of the stigma brown or brownish yellow.

Head not quite so wide as the mesothorax, transverse, very strongly narrowed behind the eyes, the temples being moderately long, but very oblique and declivous; frons rather deeply excavated to form the scrobes, with a slight medial elevation in front of the ocelli; eyes strongly emarginate internally; face nearly quadrate, slightly narrowed towards the mouth, uniformly and rather strongly convex; clypeus impressed anteriorly and with the apical margin somewhat rounded; cheeks very short; antennae about three-fourths as long as the body, slender and nearly filiform although distinctly attenuated towards the base of the flagellum, the latter 22 to 23-jointed, with a very fine, soft, short and thick pubescence. Face, base of clypeus, and scape finely, closely punctate, the face with a short, impressed sculptureless line descending medially from the antennal scrobes; impressed part of clypeus, the frons, vertex, temples and occiput polished and smooth or with excessively fine punctures, especially on the temples, the raised portion of the frons in front of the ocelli very finely, closely punctate. The grey pubescence of the face moderately thick and half erect, and considerably longer on the base of the mandibles and clypeus; temples very finely pubescent.

Thorax short and stout, strongly narrowed before and behind the gibbous mesopleura; mesoscutum rather strongly convex, the notauli wholly absent, the scutellum slightly convex; mesopleura strongly gibbous below the superior longitudinal furrow, the protuberance above the furrow and just below the tegulae narrow, somewhat cariniform, and very much less elevated than the gibbous part below; epicnemia running nearly vertically upward on to the pleura, not much inclined forward and widely separated at the extremities from the propleural suture. Propodeum not very strongly convex above and weakly declivous posteriorly; pleural carina complete; the lateral carinae of the petiolar area distinct only to the obsolete apophyses, disappearing anteriorly so that the dentiparal and spiracular areas are more or less confluent; areolar carinae not greatly distant from each other, subparallel basally, continuing apically to beyond the apophyses, where they rapidly diverge and disappear; areola with the confluent basal area more than twice as long as wide, the petiolar region short and somewhat transverse, not bounded

by a transverse carina above; propodeal spiracles rather small and oval. Mesoscutum somewhat more coarsely and as closely punctate as the face; the pro- and mesopleura including the prepectus a little more finely and much more sparsely punctate than the face; scutellum and metanotum (postscutellum) more coarsely punctate than the mesoscutum; areola and petiolar area of propodeum smooth or nearly so, and sometimes separated from each other by transverse rugosities; dentiparal region much more coarsely punctate than the mesoscutum but more sparsely, the spiracular region confluently and as equally coarsely punctate, the pleural region with a finer, sparser puncturation. The mesoscutum pubescent like the face; the apex of scutellum and the propodeum with a much longer and more recumbent pubescence.

Abdomen somewhat less than twice as long as head and thorax together, elongate fusiform, as wide as the base of the propodeum but not so wide as the mesothorax, the tergites strongly convex from side to side; basal tergite distinctly longer than the hind coxae and about a third longer than its apical width, the discal carinae extending about to the middle, then continued as rounded ridges nearly to the apex between which the postpetiole is slightly longitudinally furrowed, and laterad of which it is strongly declivous with a lateral carina reaching to the spiracles; the latter located at one-third from base; following tergites transverse, and becoming gradually shorter towards the apex, the second being longest, the fourth and fifth the widest, and following two the most transverse; second to fifth tergites each with the usual oblique impression on each side at base, and a subapical transverse impression which curves forward on each side to intercept the oblique impression, the area on each side between the impressions very slightly inflated or indistinctly tuberculate, the lateral margins longitudinally depressed and enclosing with the oblique impressions a spiracular protuberance at the basal corners, visible in dorsal view with an emargination behind especially on the second and third tergites; the second tergite with linear, slightly oblique, deep gastrocoeli reaching nearly to the middle. First to fifth tergites coarsely, closely and more or less confluently rugosopunctate with oval punctures, the base of the first, however, smooth between the carinae, and the apical margin of the following segments very slightly elevated and smoothish behind the transverse impression, the depression on the lateral margins more finely punctate, and the spiracular protuberance and gastrocoeli smooth; sixth to eighth tergites with the punctuation similar to that of the mesopleura, the eighth somewhat more closely punctate and provided with two short impressed lines converging and meeting at the middle of the base or just in front of the basal margin, with the enclosed triangular area smooth. Epipleura (ventral portions of the tergites) rather wide but not strongly chitinized; the sixth ventrite (hypopygium) squarely and broadly truncate in front of the base of the ovipositor; protruded portion of the ovipositor about as long as the basal segment and a little longer than its basal or non-protruded portion, the sheaths taken together cylindrical, thickly covered with moderate

ly long black hair. The grey pubescence on the tergites short, recumbent and sparser than on the mesoscutum, longer, somewhat thicker and at least much more prominent, however, on the black apical segments.

Legs rather short and stout; the front tibiae a little swollen and faintly constricted beyond the middle; the hind femora somewhat swollen; the hind tarsi long, the apical joint thickened towards the apex, excluding the claws about five to six times as long as the fourth joint or nearly as long as the second to fourth joints combined which are equal to first; all the claws including those of the front tarsi simple, slightly thickened at base, moderately incurved at apex and rather small, the pulvilli shorter than the claws.

Areolet of front wings rather large, broadly sessile or almost pentagonal; the discocubital vein slightly arcuate and not broken; apical abscissa of the radius very nearly straight; nervulus interstitial, or only slightly antefurcal; nervellus of hind wings broken somewhat more than half-way above the middle.

Length: 8 mm., the ovipositor 1.25 mm.

♂ Similar in color to the female throughout; the first five segments of the abdomen ferruginous, the sixth segment black with the apical and basal margins narrowly ferruginous or varying to almost entirely pale except a narrow subapical blackish band; antennae slightly darker. Legs concolorous with base of abdomen, or the front and middle pair varying to yellow, with the upper side of the femora and the apex of the middle tibiae remaining a little darker or more reddish; the hind trochanters and basal part of the pale band on hind tibiae varying to yellowish; claws of front tarsi towards apex and their pulvillus, the apical third of the last joint of the middle and hind tarsi, apex of the first and second joints of the hind tarsi, apex of hind femora and base of hind tibiae narrowly, with the apex of the latter more broadly, black or blackish.

Eyes rather more deeply emarginate than in female; the antennae considerably stouter, the flagellum composed of 23 to 24 joints, attenuated at base and somewhat less so towards apex; head otherwise, and the thorax as in female. Abdomen proportionately slightly longer and narrower than in the female, the segments less transverse since the eighth is usually nearly entirely retracted within the seventh, whereas it is always prominent in the female; basal tergite about a third longer than its apical width, strongly constricted at base, the basal third obliquely declivous with two dorsal carinae which strongly converge but do not meet posteriorly, the enclosed area slightly excavated and more deeply so at the base; the apical part nearly quadrate, slightly and broadly furrowed medially, declivous on the sides and with lateral carinae behind the spiracles which are situated a little before the middle of the segment; second tergite not greatly wider than long, the third to fifth the most transverse, the sixth a little longer than the preceding segment, the seventh triangular with the apex rounded, as long as wide, and a little longer than the sixth; eighth tergite when drawn or dissected out is

found to be divided by a median unchitinized area into two lobes, the right lobe overlapping the left; the cerci short and thick, inserted on either side of the truncate apex. Eighth ventrite similar in shape to the seventh tergite but not more than one-half as large; stipites (valvulae) of the genitalia black, covered externally with a fine, black pubescence, not very wide at base, somewhat over twice as long as the basal width, and tapering towards the rounded apex; sagittae piceous, united to form a ligulate organ about three times as long as wide, and somewhat curved downward at the acute apex. Wings and legs as in female, but the tarsi slightly shorter, the apical joint not quite so elongate, the claws rather larger and more curved at apex.

Sculpture and impressions very nearly the same throughout as in the female, but the spiracular protuberance at the basal corners of the tergites smaller, the basal segment smoothish between the carinae on the basal third, becoming punctate above between the apices of the carinae; and a longitudinal, median impression present on the second tergite between the gastrocoeli. Pubescence similar throughout to that of female, but considerably longer on the face and somewhat longer on the propodeum.

Length: 6.75 to 9 mm.

Described from two females, four males, all except one collected by Mr. Swezey. Type female, Mt. View, Hawaii, Aug. 22, 1912; paratype female, Ookala, Hawaii, Mar. 22, 1906; allotype male, Niulii, Hawaii, May 19, 1917; paratype male, Pahala, Hawaii, May 21, 1915; paratype male, Kohala, Hawaii, June 1909 (F. W. Terry); paratype male, Kipahulu, Maui, July 15, 1906. Types in the collection of the Hawaiian Entomological Society.

This species does not occur on Oahu apparently, as it can hardly be the undetermined *"Pimpla"* species mentioned by Perkins (Fauna Hawaiiensis, 2, part 6, 1910, p. 676), since under any ordinary circumstances it would not be called "commonplace".

Note on Hawaiian Platynus (Coleoptera, Carabidae).

BY DR. R. C. L. PERKINS.

(Presented by O. H. Swezey.)

In the "Fauna Hawaiiensis" two species of *Platynus* were described by Dr. Sharp, one from Haleakala, Maui, and the other from Kauai. Neither of the species was found in any numbers, and of the latter, *P. ambiens* Shp., only a single example was captured, although a large number of Carabidae was collected on Kauai, and these were to some extent examined at the time of capture, in order that I might have a good idea of the number of species that were being collected.

Recently I came across a small tube of Kauai beetles, preserved many years ago in alcohol for purposes of dissection, and was surprised to find that three of the five examples of Carabidae belonged to *Platynus ambiens,* the others being the two very common species *Metromenus pavidus* and *Disenochus aterrimus.* A very aberrant female specimen of *Rhyncogonus kauaiensis,* a few common *Proterhinus,* etc., made up the rest of the contents of the tube. It is remarkable that these few beetles picked up at random should have contained more of the *Platynus* than were found when such things were specially looked for. I may add that though these beetles had remained so many years in alcohol, they were in the best of condition and were easily mounted.

Though placed in the same genus, the two Hawaiian *Platynus* are extraordinarily different in structure and but for the pronotal setae being alike in each, they certainly would not be placed together, since each of them is far more like to some other species of Hawaiian Carabidae placed in other genera than its congener. I have not compared my specimens with the type, but Sharp's description agrees with them so admirably that there is no probability of error; indeed, there is little difficulty in identifying nearly all the Carabidae by the

descriptions in the "Fauna", so far as my experience goes.

Platynus ambiens has one peculiar character in that the pronotum along its posterior margin has distinct and fairly numerous punctures; and therein somewhat resembles some members of the *Disenochus* group (e.g. *Mauna*) though I cannot remember to have observed this in any of the *Metromenus* section.

NOTES AND EXHIBITIONS.

Dolichurus stantoni.—Mr. Bridwell recorded this roach parasite abundant on the south ridge of Kalihi Valley, April 27th; two specimens were captured and half a dozen others observed.

Scolia manilae.—Mr. Timberlake recorded the finding of this wasp established at Lahaina, Maui, April 12th. Mr. Swezey reported its spread to the coast west of Ewa Plantation on Oahu, where it was found flying over *Vitex trifolia* and *Ipomoea pes-caprae*. Mr. Osborn found it recently at Wahiawa, Oahu. Quite a rapid spread for a new introduction.

Pseudogonatopus hospes.—Mr. Swezey mentioned this Chinese Dryinid leafhopper parasite as a contrast to the above, for nothing was seen of it from 1906-7, when it was introduced and bred colonies sent around to the different sugar plantations, until 1916, when it was first recovered in the field, and was found to be quite generally established in the plantations of Oahu.

Tenodera sinensis.—Mr. Swezey exhibited a female mantis which he had captured alive on the S.S. Mauna Kea shortly after leaving Hilo, Hawaii, March 3rd, 1919. She had been kept alive until her death May 1st. She produced four egg-masses on the following dates: March 24, April 4, April 13, April 25.

Plagithmysus sp.*—Mr. Swezey exhibited a series of 7

*Described by Dr. Perkins as *Plagithmysus platydesmae*, see page 345 following. (Ed.)

specimens of this beetle bred from larvae found in *Platydesma campanulata* near Glenwood, Hawaii, March 2nd, 1919. They are strongly marked with yellow, and apparently an undescribed species.

Megatrioza palmicola.—Mr. Crawford reported that on examination of Psyllid adults and nymphs from palm from Glenwood, Hawaii, handed him by Mr. Swezey, he considered them identical with or a variation of the species on palm on Oahu. The nymphs of the Hawaii form have the marginal hairs or projections much enlarged.

Psyllids from Punaluu.—Mr. Bridwell exhibited two species of Psyllids from Punaluu, both apparently new.

JUNE 5th, 1919.

The 165th meeting of the Society was held in the usual place, Vice-President Crawford in the chair. Other members present: Messrs. Bridwell, Fullaway, Pemberton, Rosa, Swezey and Timberlake. Professor H. E. Gregory, Acting Director of the Bishop Museum, was present as a visitor.

Minutes of previous meeting were read and approved.

Mr. Swezey presented a letter from the Director of the Experiment Station, H. S. P. A., extending to the Society the privilege of making the experiment station building its headquarters as well as a depository for its library and collections.

PAPER.

The Insect Fauna of the Hawaiian Bunch Grasses (Eragrostis variabilis and Allies).

BY JOHN COLBURN BRIDWELL.

There are several species of *Eragrostis* in the Hawaiian Islands which are closely allied and have similar habitus, occurring usually in the bare wind-swept pali faces, sometimes in rather moist localities, sometimes in regions which re-

ceive only occasional showers. They are also not infrequently found in the forests where the slopes are abrupt and in some instances these grasses are to be found growing at only a few feet above sea level. All the species when growing in the wind-swept regions have long drooping leaves and rather short stout stems. They are always in bunches or tussocks, often a foot across.

These grasses appear to have attracted but little attention from the early entomologists. Blackburn found one species of *Corylophus,* which he recorded as occurring on grasses which probably occurred in bunch grass.

Mr. O. H. Swezey first found an endemic insect connected with bunch grass in 1906, which Kirkaldy described as *Kelisia swezeyi* without indication of the host plant and without recognizing its endemic nature. Ten years later a second species of *Kelisia* was found by Mr. Swezey in June, 1916, and described as *Kelisia emoloa* by Mr. Muir. Since that time much attention has been devoted to collections upon *Eragrostis* by Swezey, Timberlake, Fullaway, Giffard and the writer. These investigations have shown that the bunch grasses have a peculiar fauna of their own with several clearly endemic species, and that the tussocks furnish shelter for several other insects. This fauna has been best worked on Oahu but a few species have been studied elsewhere. It is noticeable that many of the species found in bunch grass also affect the sand-binding grass, *Sporobolus virginicus.*

Our present knowledge of the entomology of the bunch grasses may be summarized as follows:

Coleoptera.

COCCINELLIDAE.

Diomus discedens (Sharp).

This species was originally found by Blackburn and described by Dr. Sharp as a *Scymnus* but indicated as probably forming another genus. Mr. Timberlake, who has studied the species, permits me to use his unpublished reference of this

species to *Diomus*. It seems to be particularly attached to the bunch grasses and has been repeatedly taken there, but is also found in Bermuda grass.

ELATERIDAE.

At least two species of endemic Elateridae have been found in bunch grass. Several specimens of one were found in bunch grass in Iao Valley, Maui, and two specimens of another on the Manoa Ridge, Oahu (Bridwell).

CORYLOPHIDAE.

Gronevus rotundus (Sharp).

This little blackish beetle was found commonly on Manoa Ridge, June, 1919 (Bridwell). The intestinal canal of specimens examined microscopically were stuffed with fungus spores.

This species, described by Dr. Sharp as a *Corylophus* and later transferred by Matthews to his genus *Corylophodes*, appears to belong to Casey's genus *Gronevus*.

Another species which I have not seen was taken at roots of grass at the Nuuanu Pali by Blackburn and described as *Corylophus suturalis* Sharp. This has been referred to *Corylophodes* by Matthews. This may also belong to *Gronevus*.

Homoptera.

DELPHACIDAE.

Kelisia swezeyi Kirkaldy.

In Kalihi, Nuuanu and Manoa Valleys in the Koolau Mts., Mt. Kaala in the Waianae Mts., on *Eragrostis*. Also on the similar sedge *Gahnia*, Kaumuohona and Palolo Crater in the Koolau Mts. Apparently prefers the moister portions of the mountains.

Kelisia emoloa Muir.

Kuliouou, Wailupe, Waialae, Palolo, Manoa. Seems to prefer the dry ends of the lateral ridges.

Kelisia eragrosticola Muir.

Iao Valley, Maui (Giffard, Fullaway, Bridwell), Kalihi Valley, Oahu (Timberlake and Bridwell).

Kelisia sporoboricola Kirkland.

Taken on *Eragrostis atropioides* at an elevation of 7500 ft. on Haleakala, Maui (Bridwell). This has otherwise been found on Oahu, Maui and Hawaii near sea level on *Sporobolus virginicus.*

CICADELLIDAE.

Three undetermined species of *Nesosteles* have been taken. One is abundant everywhere on Oahu where the bunch grass grows. One was taken in Iao Valley, Maui, and another on *E. atropioides* on Haleakala, Maui (Bridwell).

Messrs. Giffard and Fullaway found a Cicadellid on *Eragrostis* on Diamond Head, supposedly immigrant. The genus and species have not been determined but it certainly is not any of the described genera known from the Islands. The recent discovery by Mr. Giffard of this species in the mountains of Hawaii probably indicates that it is endemic.

COCCIDAE.

The bunch grasses are commonly infested with mealy bugs supposed to be *Trionymus insularis* Ehrhorn. Whether other species occur is unknown, but the diverse species of mealy bug parasites found suggests the desirability of a further investigation of the Coccidae.

A species of *Pseudococcus* has also been taken on Diamond Head which has received a manuscript name by Mr. Ehrhorn.

Heteroptera.

LYGAEIDAE.

A species, *Nesocymus* sp., has been found abundant at the Nuuanu Pali.

Two specimens of a different but closely related Lygaeid

were found on the Manoa Ridge (Bridwell). Later the same species was found by Mr. Timberlake along the Bowman trail on the ridge Ewa of Kalihi. It has also been taken at sea level at Barber's Point and Makapuu Point (Bridwell) on *Sporobolus virginicus.*

Hymenoptera.

DRYINIDAE.

The *Nesosteles* found on Oahu is very commonly parasitized by an undescribed species of *Gonatopus.*

Kelisia swezeyi is occasionally attacked by *Pseudogonatopus perkinsi* (Ashmead).

ENCYRTIDAE.

The genus *Xanthoencyrtus* has been recently found to be represented by several wingless Hawaiian species attached to mealy bugs on *Eragrostis.* Mr. Timberlake has worked up the species.

FORMICIDAE.

Several species of ants frequent the bunches.

Thysanura.

Mr. Timberlake took a large species *(Machilis)* on the Waianae side of Mt. Kaala in bunch grass.

Corrodentia.

Several undetermined *Psocidae* are found in bunch grass on Oahu.

Orthoptera.

BLATTIDAE.

Polyzosteria soror Brunner, is very common in the bunch grass on dry ends of the lateral ridges on Oahu.

Thysanoptera.

An single individual of a peculiar thrips was found on the

Manoa Ridge (Bridwell). Several individuals of another species were found near sea level near Makapuu Point (Bridwell).

Lepidoptera.

NOCTUIDAE.

Cirphis pyrrhias (Meyrick) and C. amblycasis (Meyrick).

Swezey has found the larvae of these moths in the tussocks and other species of Noctuids also are not uncommmon.

A number of the moths feeding in vegetable debris utilize the decaying leaves and stems in the tussocks.

DISCUSSION.

Prof. Gregory responded to an invitation to address the Society, centering his remarks on the theme, "What Does the Hawaiian Entomological Society Wish the Bishop Museum to Do to Promote Entomology?" At the conclusion of Prof. Gregory's address, Mr. Swezey replied for the Society, and after some discussion it was moved and duly seconded and carried that the Society hold a special meeting on June 17th to discuss the subject and formulate a reply to Prof. Gregory's question.

NOTES AND EXHIBITIONS.

Jassid on Amarantus.—Mr. Bridwell reported finding this Jassid at Waianae. He believes it to be a species of *Empoasca* different from any of the described species in the United States. There is, however, a green species doing damage to sugar beets in California, with which he has not been able to compare it.

Rhyncogonus sp.—Mr. Bridwell reported finding at Waianae the wing covers of a species of *Rhyncogonus* different from any previously described.

Corixa sp.—Mr. Bridwell reported finding at Waianae a species of *Corixa* swimming in pools formed by the splash of the waves on the coast.

Silaon sp.—Mr. Bridwell reported finding at Waianae a species of *Silaon*—a new record for Hawaii.

Spider in Insect Boxes.—Mr. Bridwell reported finding a peculiar little spider frequenting insect boxes. It resembles a mite and differs from ordinary spiders in having a chitinous plate above and below. Probably belongs to the genus *Scaphiella* in the Family Onopidae. Another similar spider, but probably belonging to a different genus, was found in bunch grass.

Bibionid.—Mr. Bridwell reported finding in a salt marsh at Waikiki on May 30th an additional species of Bibionid fly. This species probably belongs to the genus *Scatopsis.* Another species found in these Islands is referred to a different genus. He also reported finding rather numerouly a species of *Ceratopogon,* of which genus there is a different species in the mountains.

Cephalonomia.—Mr. Bridwell also reported finding in sedge in the Waikiki marshes, a species of *Cephalonomia,* but different from the brown species obtained by Mr. Swezey from Bermuda grass, and from two others found here.

Microbracon swezeyi.—Mr. Bridwell reported capturing eight additional specimens of this species, bred by Mr. Swezey from different lepidopterous larvae in sedges on the salt marshes.

Proterhinus maurus.—Mr. Bridwell reported an additional locality for this species about half a mile from the only other known locality where it occurs, on the same peculiar species of *Sutttonia.* The other locality referred to is on the left-hand or west side of Palolo Valley, this locality is to the east side of Palolo Crater on the main ridge of the Koolau Mountains.

Sierola from Macao.—Mr. Bridwell reported finding in the material collected by Mr. Muir at Macao, a specimen referred to this genus, which was previously known only from Hawaii, Fiji, Australia and New Zealand.

Agrion xanthomelas De Selys.—Mr. Bridwell reported

noticing this species of *Agrion* common in the lowlands. Species of this genus are all considered endemic and the others seem to be confined to the mountains.

New Genus of Encyrtidae.—Mr. Timberlake exhibited specimens of an Encyrtid which appears to be new and which will constitute a new genus of Encyrtidae near *Oencyrtus* Ashmead. Only two specimens have been seen so far, one taken by Mr. Bridwell at Palolo Crater three or four months ago and one recently taken by himself on the west side of Mt. Kaala above Waianae. Whether it is endemic or not is not known.

*Hormiopterus vagrans.**—Mr. Timberlake reported taking this Braconid in the same locality (west side of Mt. Kaala above Waianae). It has previously been taken only in the S. E. Koolau mountains and on the lowlands.

Nesophryne sp.—Mr. Timberlake exhibited a specimen of a thick-set Jassid belonging to this genus, which he had collected recently on west side of Mt. Kaala above Waianae. Two other species of the genus have been previously collected on Oahu, one of these was taken by Bridwell, Swezey and Timberlake, the other only by Mr. Bridwell on windward side of Konahuanui (Malamalama).

Ilburnia oahuensis.—This leaf-hopper was also taken by Mr. Timberlake in the above locality (west side Mt. Kaala above Waianae) recently, on its usual host-plant *Charpentiera.*

Holochlora venosa.—Mr. Swezey exhibited a female specimen of this large katydid which he collected May 25th on the top of Lanihuli Peak. This is the highest elevation and the greatest distance from Honolulu that the insect has been taken. It has also been found by Mr. Bridwell on the Bowman Trail.

Lagocheirus obsoletus.—Mr. Swezey exhibited specimens of the adult, larvae and pupae of this Cerambycid beetle taken from a standing dead kukui trunk, May 30th, on Wailupe

*Described on page 390 following. (Ed.)

Ridge. Apparently the tree had been destroyed by the windstorm of December 2-3, 1918. The standing portion of the trunk had been invaded by this beetle. The larvae had eaten the whole inner layer of bark and the outer part of the wood slightly. Some of the larvae had burrowed into the wood for pupation, but others had remained where they had been feeding beneath the bark.

A full grown larva of *Chalcolepidius erythroloma* was also found under the bark. Being predacious, it had probably been feeding on the other larvae.

Dolichurus stantoni.—A pair of this Philippine roach parasite was exhibited by Mr. Swezey, taken on Wailupe Ridge May 30th. The wasp was introduced less than two years ago. This is the farthest east it is known to have spread. It has already been recovered on Mt. Tantalus, Lanihuli Ridge, Kalihi, and in the cane fields as far west as above Pearl City.

Aloha kirkaldyi.—A specimen was exhibited, and Mr. Swezey reported collecting half a dozen of this Delphacid on *Euphorbia* May 25th along the trail leading up to Lanihuli from the upper part of Nuuanu Valley. This insect had previously been collected at Punaluu and the eastern slopes of Mt. Kaala.

Kelisia swezeyi.—Mr. Swezey exhibited a single male specimen of this Delphacid taken June 1st on *Eragrostis variabilis* growing at an elevation of 2800 feet above Waianae Valley. This extends the range of this insect, it having been previously collected in Palolo, Manoa, Nuuanu and on the east slope of Mt. Kaala.

Dictyophorodelphax mirabilis.—Mr. Swezey exhibited a specimen and reported collecting this strange Delphacid on *Euphorbia hillebrandi* at an elevation of 2500 feet above Waianae Valley. This extends the range of the insect farther towards the northwestern extremity of the island. The previously known western limit was the east side of Mt. Kaala, where it was collected in 1916. It has so far been collected but a lit-

tle to the east from the Kaumuohona locality, where it was first discovered in 1906.

Cerotrioza bivittata.—Mr. Swezey reported having collected 13 specimens of this small Psyllid from *Xylosoma hawaiiense* on Wailupe Ridge, May 30th. This is probably as many as all that have been previously collected. The nymphs were found on the leaves feeding externally without being in a gall, but in a slight depression. This was surrounded by a red spot.

Sclerodermus chilonellae.—Mr. Swezey reported finding this wingless parasite of lepidopterous wood-feeding larvae, on Wailupe Ridge, May 30th, in dead *Smilax*. It had previously been taken only on Tantalus.

JUNE 17th, 1919.

A special meeting of the Hawaiian Entomological Society was held in the usual place, Vice-President Crawford in the chair. Other members present: Messrs. Crawford, Bridwell, Timberlake, Swezey, Osborn, Rosa, and Pemberton.

The meeting was held to hear and consider the report of a special committee appointed to formulate recommendations to the Bishop Museum in regard to future needs and opportunities for entomological work to be conducted by this institution.

The recommendations of the Committee, as adopted after considerable discussion, were as follows:

Recommendations by the Hawaiian Entomological Society of the Lines of Entomological Work Which Would Appropriately Fall Within the Scope of the Bishop Museum.

The Hawaiian Entomological Society, having been asked by Dr. Herbert Gregory, Director of the Bishop Museum, for an expression of opinion as to what the Society considered the part that the Museum should have in the Entomological work of the Hawaiian Islands, presents the following recommendations, formulated by a special committee and adopted after dis-

cussion at a special meeting of the Society called for that purpose, June 17th:

1. A Descriptive Card Catalogue of all insects recorded in Hawaii should be compiled and maintained at the Museum; and a Check List and Bibliography should be printed. This is necessary as a basis for future work, in order that what has already been done may readily be ascertained and where to find it in the literature. Ultimately, similar Catalogues should be prepared for the whole Pacific. The Library should be made as complete as possible in literature on Hawaiian entomology; in fact, for that matter, inclusive of the whole Pacific, ultimately. (It is advisable, if it is possible to do so, that the entomological books of the Library be made available for withdrawal when desired for use outside by the entomologists of the other Institutions on occasions when it is impossible or inconvenient for them to spend the necessary time at the Museum to make use of them.)

2. At the Museum should be acquired and maintained available for study, the most complete Reference Collection of Hawaiian insects in the Islands. At present, the Museum has in the Perkins collection a very substantial beginning for this. It contains 64% of the species known and listed at the time the "Fauna Hawaiiensis" was published. Many new species have been described since then, new immigrants have arrived, and there have been many insects purposely introduced on account of their economic importance. The Museum collection should contain specimens of all of these. The entomologists of the other Institutions of the Territory are ready to coöperate in bringing the Museum collection to completion. The introduced insects can readily be supplied.

Much will remain, however, for the Museum to do in the way of expeditions to particular localities of the Islands for securing specimens of species now lacking in the collection, as well as search for new species, which are continually being found by the incidental collecting trips of the entomologists of

the other Institutions. There are many localities where the native forests are rapidly disappearing, in which insect collecting should be thoroughly done before it is too late. Some such places are the Kohala Mountains, slopes of Hualalai and other parts of Kona, and other regions of the forest slopes of Mauna Loa and Mauna Kea on the Island of Hawaii; Ulupalakua and other parts of the slopes of Haleakala on Maui; and similar conditions on the other Islands where the forests are receding, due to the advancing of agricultural interests and further encroachment of the cattle on the ranges.

Many desirable places for collecting where the forests are still in good condition, are much better accessible at present than when Dr. Perkins was collecting. For example: Waiahole, Wahiawa, and Punaluu of the Koolau Mountains of this Island, and many places on the other Islands where the rain forests have been penetrated to their hearts by the great ditches to secure water for irrigation purposes on the sugar plantations. These regions should be explored for insects, and it is to be expected that rich results would be attained as has already resulted from their botanical exploration.

3. "Types." The Entomological Society has established a "type collection" to contain the "types" of new species described by its members, and to be in the custody of certain of its officers, and for the present located at the entomological laboratory of the Hawaiian Sugar Planters' Experiment Station, where the Society has its headquarters. It seems, however, that logically the Museum should eventually become the depository for "types", when proper or satisfactory organization has been effected for carrying on entomological work at the Museum.

4. There are problems of interest in distribution, both locally and for the whole Pacific, which would naturally fall within the scope of work of the Museum. As is well known in other Natural History branches here, this is a very important line of research here. Much more insect collecting is desirable for a basis for consideration of these problems.

5. Biological Problems. There is no end to work along these lines. In the "Introduction" to the "Fauna Hawaiiensis", Dr. Perkins has given a substantial basis for future work in this direction, but by reference to this work, it is readily seen that there is a great deal to be done in the study of the habits of Hawaiian insects, their life-histories, their relations to food-plants, relations of parasites to hosts, etc., etc. The entomologists of the other institutions are continually making some advances in these lines, but in the main it is only incidental to their work. The greater share of this falls within the scope of the Museum. Work of this nature would be greatly facilitated by the establishment of a Mountain Camp which could be used conjointly by the other departments of Natural History at the Museum.

6. Provision for the publication of entomological papers naturally follows; not to replace the "Proceedings" of the Hawaiian Entomological Society, but for the publication of results obtained in any line of entomological work at the Museum, as well as taxonomic papers prepared by any of the entomologists.

7. The Entomological Society has considerable interest in the Entomology of the Pacific as a whole and recognizes the importance of such study and its bearings on many of the problems of the Pacific. It feels that the Bishop Museum would be the logical center for this line of research.

8 The Entomological Society is ready to coöperate in much of what is outlined above as far as the different members are able, but it seems necessary for accomplishing substantial advancement in the lines of work suggested, that an Entomological Staff be maintained at the Museum.

D. L. Crawford,
O. H. Swezey,
J. C. Bridwell,
D. T. Fullaway,
Committee.

JULY 3rd, 1919.

The 166th meeting of the Society was held in the usual place, Vice-President Crawford in the chair. Other members present were: Brother Matthias Newell of Hilo, Messrs. Grinnell, Bridwell, Timberlake, Willard, Osborn, Ehrhorn, Swezey, Potter, Rosa, and Fullaway. Messrs. Bryan and Stickney were visitors.

The minutes of the previous meeting and of special meeting held June 17th were read and approved with corrections.

PAPERS.

Some Notes on Hawaiian and Other Bethylidae (Hymenoptera) With the Description of a New Genus and Species. 2nd Paper.

BY JOHN COLBURN BRIDWELL.

11. The Biology of Sclerodermus.

Sir Sidney Smith Saunders bred adults of this genus from twigs in which were enclosed the nests of *Odynerus* and other wasps, the *Odynerus* nests containing caterpillars as food for the wasp grubs. Another investigator observed a group of Hymenopterous larvae upon a Cerambycid larva and later bred from these some adult *Sclerodermus*. Mr. O. H. Swezey bred an endemic Hawaiian species from the larva of a wood boring moth, *Hyposmocoma chilonella*. The writer has found several other Hawaiian species associated with other similar moth larvae and a supposedly immigrant species described by him as *S. immigrans*, was found attacking the cocooned larva of the Bruchid, *Caryoborus gonagra*.

The discovery of this species in association with *Neoclytarlus euphorbiae* Bridwell on the Ewa Coral Plain in June, 1919, and subsequently generally distributed over the lowlands of Oahu associated with the larvae of other wood boring beetles, has enabled me to work out in considerable detail the

life history and habits of this species and to find a method by which the endemic species could be bred in the lowlands.

Variation and Dimorphism. These studies have revealed genetic problems of great interest which it seems desirable to have investigated in earnest and with adequate resources in the near future. There are, as disclosed by the work of the past year, in this easily bred species four forms of adults: (1) an alate female occurring in large numbers but probably not more than half as numerous as the (2) apterous female and (3) an alate male and an exceedingly rare (4) apterous male. Besides these dimorphs in each sex, the females are exceedingly variable in coloration with a range of color from honey yellow with only the slightest traces of infuscation to forms appearing almost wholly black, only the propodeum showing traces of paler coloration. Since the supposed species among the endemic forms have been described mainly on color characters, it is desirable that the whole question of the relation of these various forms should be attacked by breeding methods. While some of the species are known to possess good structural characters separating them, it is desirable to investigate the whole question of the relation of the various forms.

All the species studied have shown much similarity of habits and the life history of the species may be generalized in this way.

Emergence and Mating. The males emerge from the massed cocoons before the females and under ordinary conditions are present in not more than one-fifth the numbers of the females. The males on emerging from their own cocoons soon gnaw their way into the cocoons of the females and mate there and continue doing so until the females have emerged. The female which has laid the mass of eggs remains with the feeding larvae usually until the larvae have cocooned and sometimes, at least, until her progeny have emerged, and under these conditions she may become re-impregnated by her

own offspring. In any case the females are usually fertilized by close in-breeding, either fraternal or filial. Out-breeding is not however excluded, for in some of these masses of cocoons the males fail to complete their transformations and these females may be impregnated by strange males and a female which has left her cocoon mass after laying most of her impregnated eggs may encounter and mate with a strange male. In every case studied the eggs laid by unimpregnated females produced only males, as seems to be general among the Bethylidae. Mr. Busck's observations on *Perisierola* to the contrary have not agreed with my experience with the same species and Mr. H. F. Willard has conducted a long series of as yet unpublished experiments in which isolated females have never produced female progeny.

The emerging females also assist the others to emerge and remain together upon the cocoon mass for some days and before the colony scatters the cocoons are almost entirely destroyed, apparently being eaten by the adults.

Food. Careful examination of the habits of the adults have failed to disclose any habitual use of food other than that furnished by the prey. Saccharine substances such as honey or sugar and water were always refused and water was refused unless after a period of starvation. Adult females placed with bits of the pulp of banana at first refused it but fed upon it freely after it had fermented and developed a growth of moulds. The males upon being placed with females with their prey fed in the same manner.

Conflict with the Prey. The conflict between the *Sclerodermus* and her prey was quite peculiar and certain differences were revealed between *S. immigrans* ordinarily utilizing Colepterous larvae and the endemic species which habitually attack the more aggressive Lepidopterous larvae, but in either case the first attack was directed toward the mouth and seemed designed to paralyze the mandibles. In this attack the *Sclerodermus* holds herself straight and attacks backward,

seeming like an animated dagger directed at the mouth of her prey. This moment of attack is the most dangerous of the ordinary life of the insect and is always preceded by a careful examination of the surroundings and the establishing of special means of retreat by gnawing away retreats into the rotten wood if this is necessary. Even with these precautions taken, if the prey is active and particularly if it is a species with powerful mandibular development the conflict may result in the death of the *Sclerodermus*. Many such deaths were observed under experimental conditions when *Sclerodermus immigrans* was placed with the larger Cerambycid larvae, such as those of *Lagocheirus obsoletus* Thomson, *Coptops aedificator* (Fabricius), and even *Prosoplus bankii* (Fabricius), and it was also the case in many instances with the endemic species in conflict with Lepidopterous larvae.

After the initial attack upon the head, the *Sclerodermus* proceeds more at leisure to paralyze the remainder of the larva and this is frequently a long drawn out and protracted process. While some particular effort seemed to be directed toward the presumed position of thoracic and anal ganglia, the observation of hundreds of such struggles has convinced me that the stinging reflex is in no way precise but that sooner or later the grub will be stung in every region which gives a muscular response to the feeding of the female or to her exploratory movements over the body of the grub. To me it seems the venom is injected into the body fluid and produces its paralyzing effect when finally it comes in contact with the nerve centers. Frequently the earlier stinging did not result in complete and permanent paralysis and in cases where the female was removed from the prey soon after oviposition, the grubs revived and were able to dislodge the feeding larvae of *Sclerodermus*. The venom did not appear to arrest the transformations of beetle larvae if they had been attacked during the prepupal stage after completing feeding and instances occurred where such larvae completed their transformations after the larvae of *Sclerodermus* had begun to feed.

Tolerance. It is of interest that in several cases more than one female was found in the field associated with a single host larva. In experimental work along this line there seemed to be no limit whatever to the number of *Sclerodermus immigrans* which would simultaneously but without any particular cooperation join in mastering a single beetle grub and the relatively enormous full-grown grubs of *Xystrocera globosa* (Olivier) and *Aegosoma reflexum* Karsch were always ultimately overcome if enough individuals were placed with them. Further, these females invariably lived in harmony upon the paralyzed prey, oviposited, and the progeny of the different females fed and reached maturity without interference from the others. This tolerance extended even to the grubs of other species of *Sclerodermus* and, while the experimental work was not continued as long as is desirable, adults of different species were secured which had developed together on the same larva. This interspecific tolerance is the more surprising from the fact that *Sclerodermus immigrans* readily attacked and fed upon and its grubs developed to adults on the grubs of bees of the genus *Nesoprosopis*; of the fossorial wasps *Crabo* and *Sceliphron;* the ants, *Tetramorium guineense* (Fabricius) and *Camponotus maculatus* (Fabricius), and even the Braconid and Chalcidoid parasites, *Hormiopterus* and *Eupelmus* which were associated with the *Neoclytarlus.*

Conflicts of Sclerodermus immigrans with its Prey. A female was observed attempting to sting the prepupal larva of *Neoclytarlus euphorbiae.* She grasped the edges of the sutures of the middle of the abdomen with her mandibles and holding on with her legs, curved her abdomen and body around the larva attempted to sting it on the ventral side in the vicinity of the suture between the fifth and sixth segments. The larva responded to this effort by violent contortions during which it rotated first in one direction and then in the other, but without being able to dislodge the *Sclerodermus.* I could not make out whether she was able to penetrate its skin with her sting.

A female placed with a larva of *Neoclytarlus* was ob-

served stinging it about the head, sometimes barely escaping the jaws of the larva. After much effort directed against the head, she was seen stinging it near the center of the mesosternum and in the suture between the mesosternum and prosternum and worked her way along the sides of the segments to near the anal extremity, apparently stinging wherever she secured a response to her prodding with the end of the abdomen. She then returned to the head, prodding tentatively about the mouth, then made a long sustained sting in the middle of the pro-mesonotal suture and another perhaps at the anterior margin of the first tergite laterally. At the end of this operation she had difficulty in removing her sting and in the struggle to extricate it, it was seen to be very elongate so as to penetrate nearly or quite half through the larva. After this the larva became quiescent and she began pinching the cuticle with her mandibles in feeding.

Another female of this species which had been placed with a nearly full fed larva of *Prosoplus* in a twig, had not paralyzed it and this larva was removed from the twig and placed with the *Sclerodermus* female. After some time she was observed in conflict with it, attacking it near the middle of its abdomen. The *Prosoplus* larva was strong and vigorous, larger than the *Neoclytarlus* larva from which the material from Ewa Coral Plain has been bred and its skin is apparently tougher. The struggles, contortions, twistings and rotations of the *Prosoplus* larva did not once serve to dislodge her. Grasping the cuticle of the edges of the sutures, she was constantly endeavoring to sting, apparently without much choice of position. Occasionally she was able to deflect the end of her abdomen nearly vertically to the surface and held this position, the rest of her body well curved round the body of the *Prosoplus*. It was doubtless then that she did her most successful stinging. In the struggles she worked her way backward and forward above the body of the *Prosoplus* and around and around, constantly stinging or attempting to do so. During the latter part of the combat she seemed to

concentrate more of her efforts toward the thorax and head, two or three times she worked about the head as if attempting to sting there, while the *Prosoplus* attempted to grasp the end of her abdomen. At length the struggles of the *Prosoplus* grew weaker and weaker and she was able to pursue her work more easily and could occasionally clean away the wood dust which had accumulated on her body. She proceeded to the anal extremity of the body and carefully and deliberately stung in the sutures there two or three times near the lateral margin and then worked her way along the body, inflicting a sting apparently wherever she could get a response to her gnawing the surface, working along thus to the head. By this time the larva was practically immobile and from time to time she would rest and bite at the cuticle in feeding.

I did not time this struggle but it must have continued twenty minutes or more and at its conclusion the *Prosoplus* larva was completely immovable and did not struggle at all when she fed in the usual manner of her kind.

Conflict of Sclerodermus chilonellae with its Prey. This species is much larger and stronger than *S. immigrans* and attacks the vigorous woodboring larva of *Hyposmocoma chilonella.* Three females were bred from cocoons brought in from rotten wood of *Pipturus* in which were many larvae of this moth. A larva was placed with these three females and a male on July 7, and on July 10, the larva was seen to be paralyzed and was completely sucked dry. Another larva placed with them on the same day was paralyzed on July 12, and completely sucked dry by July 14.

One female and the male were separated and placed with a large *Hyposmocoma chilonella* larva, by which the male was soon killed. The other two were placed with another *Hyposmocoma* larva about 20 mm. long and they proceeded to attack it jointly, their bodies straight and backing up to sting. They were exceedingly active on their feet, dodging the attacks of the *Hyposmocoma,* the latter being very aggressive in its efforts to bite the end of the abdomen of the

Sclerodermus. It seems to be the purpose of the *Sclerodermus* to provoke the attack, for when this takes place it dodges and strikes with its sting and the larva sometimes seems to have succeeded in getting hold of the abdomen, but it did not in this case and soon after it became quiescent and the *Sclerodermus* females were seen feeding over the surface, nipping the cuticle to suck its juice.

After a half hour or so the *Hyposmocoma* larva which had been isolated not being attacked and having walled itself away from the *Sclerodermus,* they were both placed in the tube with the other larva and the two females. Here it was very restless and began creating a disturbance, for it was larger and more powerful than the other larva. The *Sclerodermus* female which had been moved with it began to make tentative approaches and examinations, and after she had learned her way about among the bits of rotten wood in the tube, she began to be more definite in her examinations, examining it with her antennae when she encountered it and then began to back up to it and to attack backward. Some of these attacks were made at the anal extremity and a few at the side, but after a while it succeeded in arousing the attack of the larva and the fencing between the two was fast and furious, now one seeming to have the advantage and now the other. The *Sclerodermus* was once seen with its sting inserted at the upper base of the mandible but the direction of the attack was toward the throat. After perhaps a minute of this conflict the combatants separated and the *Sclerodermus* retired to a sheltered place. The *Hposmocoma* larva seemed partially stupefied and ceased to move around so actively. After fifteen or twenty minutes it began to move about again but less vigorously and the attack was renewed, generally directed against the head but occasionally pressed against the sides of the thoracic segment. This time the conflict was noticeably shorter and at its end the larva retired a little while the *Sclerodermus* held its ground. By this time the larva had begun to be noticeably paler, an indication of

the increasing paralyzation. They came to rest with the abdomen directed toward the head of the larva and not quite touching it. From time to time the larva seemed to relax so as to touch the *Sclerodermus* which would stir slightly but without trying to sting, but the larva would jerk back each time.

After about ten minutes of this, there was a moment of fencing again, only two or three movements of the larva and corresponding stinging movements of the *Sclerodermus* but apparently no actual stinging and the conditions were resumed. After about three minutes the caterpillar's head sank down but very soon the conflict was renewed, the *Sclerodermus* attacking along almost the entire length of the larva, which was aggressive and changed its position entirely. After this conflict the *Sclerodermus* retired to shelter again some distance away.

Definite efforts were apparently made in this conflict to sting on the side of the anal extremity and the side of the thorax as well as at the head.

After this conflict both insects remained quiescent for some time but after about 20 minutes, the caterpillar began to move slowly and in about half an hour it was able to move about rather freely but more feebly. In the meantime the *Sclerodermus* female had joined the others, doubtless more or less confused by the presence of the quiet larva paralyzed by the other two females.

Oviposition. The females have not been observed to oviposit in any case short of seven days after emergence, giving them ample time for emergence, consumption of the cocoon, dispersal, finding the prey, mastering the prey, feeding upon it and a resting period afterward.

Careful observation shows that the female does not prepare a place for oviposition by piercing the skin of the prey with her mandibles or sting. In oviposition the body is curved transversely around the body of the larva. The sting and sheaths are extended and the hypopygium was widely sepa-

rated from them. She holds herself for some time immobile except for one hind leg and the ovipositor and sheath which move slightly from time to time, finally the egg glides slowly out under the sheaths and sting. After the discharge of the egg, she leaves at once without examining the egg.

The process of oviposition occupies two or three days ordinarily, and this is followed by some days interval before the next lot are ready. The eggs being large in proportion to the size of the insect a gravid female has her abdomen considerably distended just before oviposition.

The number of eggs laid upon a particular grub seemed in most cases to show some relation to its size, but this may be due to the female eating some of her own eggs, for this has been observed in numerous cases where the beetle larvae had become so dry as to be unsuitable for her food. The number of eggs laid in a single batch seems to run from about ten to nearly forty and a single female may lay from four to six or more batches of eggs with intervals of five to seven or more days between; my observations do not enable me to state with any accuracy the number of eggs laid by a single female nor her usual length of life, but probably not many females lay more than 150 eggs nor live more than three months.

General Habits. The females are exceedingly hardy in their natural environment and work their way readily through the bark, rotten wood, and debris produced by other insects, using their stout mandibles to gnaw their way about if necessary. In my earlier work with them several were lost by their eating their way through corks in vials in which they had been confined. They are not readily killed by cyanide of potassium and frequently revive after having apparently been killed and mounted on points. The alate females do not readily employ their wings in flight but will do so on occasion, especially in the sunshine. The males are much less hardy than the females and are usually dead by the time the females begin oviposition. In several cases where a male was

left with a female and her quiescent prey, it has been found decapitated and the females were jealous of the feeding of the male on the grub, as the egg laying time approaches driving it away.

The Prey of Sclerodermus immigrans. As has been already indicated, the adult females show remarkable versatility in their attacks upon possible prey and great catholicity in their choice. It was only in the case of *S. immigrans* that I was able to carry on any extended series of breedings but the few experiments which I was able to carry on with the endemic species gave no indication of any difference in this regard. I was unable to determine that this *Sclerodermus* would reject any Coleopterous larva whatever, and I have succeeded in breeding it from *Caryoborus gonagra* (Fabricius) (Bruchidae); *Sinoxylon conigerum* Gerstaecker, *Schistoceros cornutus* (Pallas) (Bostrychidae); several species of endemic Anobiidae; *Tenebroides mauritanicus* or a related species (Temnochilidae); *Tribolium ferrugineum* (Fabricius), *Gnathocerus cornutus* (Fabricius) (Tenebrionidae); *Lagocheirus obsoletus* Thomson, *Coptops aedificator* (Fabricius), *Xystrocera globosa* (Oliver), and *Neoclytarlus euphorbiae* Bridwell (Cerambycidae). In the case of the few Elaterid larvae which happened to be available furious attacks were made but the larvae were able to escape by forcing their way through the cotton plug with which the tubes containing them were closed, dislodging the *Sclerodermus* on the way. Several Rhyncophorous grubs were used but as it happened all died before the *Sclerodermus* larvae finished feeding. In general this was the case with the wood-boring and other Lepidopterous larvae used, the lowland climate being exceedingly likely to induce moulds and other troubles with these inhabitants of the cooler climate of the mountains. The Hymenoptera utilized have been already indicated. Perhaps the most surprising host upon which this *Sclerodermus* was bred was the termite, *Calotermes cantaneus* (Burmeister). In this species the mud-like anal discharge occasionally killed

the *Sclerodermus,* but usually they were able to master the ordinary forms of workers and nymphs and the dealated adults, but in every case the soldiers were able to kill their assailants. Several hundred *Sclerodermi* in all were bred from this host.

The only possible prey rejected by this species which were offered were paralyzed crab-spiders from the nests of *Sceliphron,* a mealy bug of the genus *Pseudococcus,* and the larvae of a species of flesh fly, *Sarcophaga.* The refusal of the mealy bugs and spiders was absolute, the *Sclerodermi* placed with them dying of starvation. The behavior with the *Sarcophaga* larvae and the puparia into which some of them transformed was interesting and the *Sclerodermi* showed marked differences in their actions towards the puparia. A lot of *Sarcophaga* larvae were squeezed from the mother fly and placed upon cooked meat, Oct. 8, 1919, and this moistened with water the next day. On Oct. 10 they were removed from the decayed meat, placed in coral sand to absorb as much of the juices as possible, washed in clean water and dried on blotting paper and placed separately in tubes plugged with absorbent cotton and a female *Sclerodermus immigrans* placed with each. In almost every case the *Sclerodermus* removed to the farthest point in the tube and remained there. In several cases, however, the maggot in its wanderings crowded near the *Sclerodermus* and in these she attacked the larva with her sting from the cotton but did not take hold with mandibles and feet. On Oct. 11, out of forty-nine *Sclerodermi* placed with *Sarcophaga* larvae thirteen were dead and out of the thirty-six surviving but one was found close to the maggot. The deaths of the thirteen *Sclerodermi* were in most cases probably due to starvation. Some, however, were dead on account of the foul discharges of the larvae, *per ano,* which had covered the *Sclerodermi,* and it may be that this was the principal cause of death in the others as well. All the maggots had passed such discharges but it was in some cases dried about the anus of the maggot and had not greatly contaminated the tubes. The maggots were removed

and placed with the *Sclerodermus* in clean, fresh tubes. By Oct. 13 twenty of the fifty maggots had pupated and the remaining larvae were more or less collapsed and dried up without any positive indication of their having been fed upon by the *Sclerodermus*. When some of the puparia were opened up the *Sclerodermus* female at once attacked them and fed upon the pupa freely and in one instance a *Sclerodermus* was seen gnawing away around the anal pit of the *Sarcophaga* puparium in the effort to enter.

The kinds of prey actually known to be utilized in the field are the Bruchid, the two Bostrychids, and the Cerambycid larvae excepting the *Xystrocera*. It is evident that several things tend to limit them in actual practise: (1) The adult *Sclerodermi* like to frequent dead and seasoning or rotten wood and practically confine their visits there. The pods of *Acacia farnesiana* in which *Caryoborus* was found attacked is only an apparent exception. In its properties it is near enough like the wood and is found attached to the bushes. (2) Otherwise available prey may be able to destroy the females. (3) Some of the prey may not keep in condition for larval food long enough for them to reach full growth. (4) The termites and ants would not usually be attacked because entrance to the nests would be successfully resisted.

Prey of the Endemic Species. The endemic species of *Sclerodermus* have until 1919 always been found in association with wood-boring larvae of moths related to *Hyposmocoma*, *Semnoprepia*, and *Hyperdasys*, but in August, 1919, Mr. Swezey secured material of *S. muiri* Bridwell from Kona, Hawaii, above Kealakekua in wood of *Straussia*, where it was taken from the borings of an Anobiid beetle upon the larvae of which they had evidently bred. The material consisted of two masses of cocoons of three and five from which three and four apterous females emerged respectively. Repeated examination of material in the mountains near Honolulu has disclosed but little indication of use by any of the endemic species of Coleopterous larvae but *S. poecilodes* Perkins was

occasionally found under circumstances indicating the occasional use of Rhynchophorous larvae.*

However, by the use of the larvae of *Neoclytarlus euphorbiae* it was found possible to breed the endemic mountain species in the warmer climate of the lowlands in Honolulu. In this way I have been able to breed considerable numbers of *S. chilonellae* Bridwell, *S. polynesialis* Saunders, and *S. poecilodes* Perkins.** Only inadequate material of *S. tantalus* Bridwell and *S. kaalae* were obtained.

Development. The eggs hatch in three or four days, the larvae feed for about five days and the prepupal period, including cocooning, the prepupal period and chitinization of the adults, require about fourteen or fifteen days, so that the entire development from egg to adult requires from twenty-two to twenty-four days. This with seven days for the development of the eggs gives approximately thirty days from egg to egg.

The earlier stages of the larvae feed upon the surface of the prey and then on reaching their full size the larvae gnaw their way through the larval skin of the host and push their heads and part of their body into the interior of the larva for their final feeding, much as recorded by Dr. F. X. Williams for *Epyris extraneus.*

The instars of the larvae were not worked out in detail, but an interesting development of the larval mandible was observed, that of the first instar larvae being apparently simple while the last instar has it pectinate with about eight long teeth, the number of teeth increasing with the moults.

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*In January, 1920, the writer found abundant material of *S. polynesialis* Saunders attacking both moth larvae and *Clytarlus indecens* larvae in the stems of *Smilax* on Mt. Kaala in the Waianae Mts. of Oahu. A large proportion of the females were alate, the first alate females found in any of the endemic species.

**This interesting line of work was cut short by the writer's taking up anew his studies of the Bruchidae. It is to be hoped that further studies of these endemic forms may be taken up and the comparative biology worked out.

The cocoons require about two days for construction and are built in a fairly compact mass in the vicinity of the prey upon which the larvae have fed. This has ordinarily been almost completely consumed by the larvae and their mother.

As has been previously recorded, the mother feeds with the larvae and on occasions when the prey deteriorates before the larvae are full-grown she may resort to cannibalism, feeding upon her eggs or larvae. In one instance two larvae were found feeding upon one of their own kind which had perished on account of the deterioration of their food.

The female does not pierce the skin of her prey with her mandibles but apparently forces the juices out through the cuticle with her mandibles. She later feeds upon the juices exuding from the wounds made by the larvae. I have not been able to discover any certain evidence of any kind of maternal assistance to the larvae.

12. Scleroderмus Immigrans, an Immigrant from the Philippine Islands.

This species was taken originally from the cocoons of the Bruchid, *Caryborus gonagra,* in the pods of *Acacia farnesiana* on the island of Oahu. In describing the species it was said to be in all probability an immigrant into the Hawaiian Islands. This belief has been confirmed since a female collected by Dr. F X. Williams at Los Banos, Luzon, Philippine Islands, now in the collection of the Hawaiian Sugar Planters' Association proves to belong to this species. Dr. Williams informs me that the species is not uncommon there and is semidomestic, being associated with Bostrychid beetle larvae in the houses.

13. Notes on the Biology of a Cephalonomia.

Several small Scolytidae of the genus *Hypothenemus* and its allies have been described from the Hawaiian Islands, are numerous in individuals but at present we have but little detailed information regarding their habits and they

have never been tabulated. Some of the species are twig borers, the adults mining in the drying twigs of various plants. The adults are commonly associated in small colonies; whether these are the descendants of one stem mother which had founded the colony, or whether on account of their abundance, several are associated in working the suitable twigs, I cannot say. The entrances to their mines are usually at the nodes of the twigs or they may start at the ends or from the ends of the burrows of *Sinoxylon conigerum* or *Schistoceros cornutus*. From the entrance tunnels usually run in both directions, either just under the bark or in the pith, or if associated with the Bostrychid beetles, they may follow the larval tunnels of the latter. In any case the mother beetle, when she has excavated her tunnel to suit her taste, lays five or six eggs very large in proportion to her size. The larvae which hatch from these appear to live upon wood which they excavate for themselves, or possibly they are assisted in this by the adults. These larvae are of the common form of beetle grubs in the group but are very small and feeble.

Dr. Perkins records in the Fauna Hawaiiensis a *Cephalonomia* attacking these. I am uncertain whether the species referred to is the one whose habits are discussed here, or a brownish one found by Mr. Swezey associated with a species of *Hypothenemus* living in the stems of Bermuda grass.

I have never been able to locate living material of any such species in desultory examination, but on May 30, 1919, I swept a small black *Cephalonomia* in the Waikiki marshes which belonged to a species unrepresented in the collections here. Again on examining some twigs of *Euphorbia multiformis* infested by three or more species of *Hypothenemus* (s. l.) which had been brought in from Ewa Coral Plain on June 8 and 10, 1919, four females were discovered, three of them associated with small white cocoons in the *Hypothenemus* tunnels. I determined to attempt breeding them artificially.

In order to have control of my material I cut into twigs

until I found burrows containing larvae. These were then transferred with a brush into *Hypothenemus* burrows in a short bit of a twig and this placed in short sections of glass tube and this plugged up with cotton after placing a female *Cephalomomia* with them. This is not such a simple matter, since the female is only a millimeter long and the *Hypothenemus* is shorter though very much stouter.

One of the females was unfortunately injured and was mounted for preservation. Three females remained for breeding purposes.

After three or four days one of the twigs was opened and two larvae were found bearing each a single egg on the venter, and in about two weeks, from these a female bred out. This female was so treated for five successive times and each examination revealed larvae of *Hypothenemus* bearing one, two or three eggs or larvae, according to circumstances, and a fair share of these reached full growth and cocooned. The other two females were less fruitful and only a single pupa bearing a larva of the *Cephalonomia* on the dorsum of its abdomen was obtained. One of them died without any egg laying.

These trials revealed certain interesting facts: The egg laying is slow; the females can live for considerable time with only their host insects for food; usually adult *Hypothememus* present in the twigs were dead or if living had lost their power of locomotion, the only signs of life being a slight twitching movement of the legs. Further observation showed that when pressed for food the *Cephalonomia* will feed upon the *Hypothenemus* pupa and adult as well as sucking the juices of the larva.

Having gone so far in the study of these species, I became desirous of seeing how the minute *Cephalonomia* goes to work in attacking its victims. I had found them not disposed to work upon the larvae outside of the tunnels in the wood and they did not easily become interested in larger *Xyleborus* larvae in williwili wood.

At length it occurred to me that they might work under

observation if placed in fine glass tubes with their prey. So fine glass tubes were drawn out from the glass tubing of about one-fourth inch which had been used to contain the twigs and larvae placed with these, the larger ends serving as entrance chambers. These tubes were a little larger than the *Hypothenemus* tunnels. Larvae placed in these tubes with the *Cephalonomia* alone interested her, but she seemed disturbed. On adding the fine debris from the *Hypothnemus* tunnels conditions were more nearly normal and I was able to observe her at work making her way slowly through the debris. When she encountered a larva she would examine it for a moment, then proceed to sting it in the head without much of an effort and pass on with little consideration for her victim and no evidence of any fear of injury from its mandibles. When a pupa was encountered, the apex of the abdomen was the part attacked. In this way in a very few moments all the larvae and a pupa were attacked and quieted. By the next morning all the larvae and pupae (six in all) were paralyzed, but no eggs had been yet laid on the second day.

My observations upon this species were unfortunately cut short owing to my preoccupation with the *Sclerodermus*. It was found possible in this way to breed the species but the time required to find the minute larvae necessary for breeding the species made is possible to do only desultory work on this species. Newly hatched *Neoclytarlus* larvae, small *Sinoxylon* larvae and *Proterhinus* larvae and pupae were however utilized by the adults for food and eggs laid upon them. The larvae of a Scolytid breeding in wiliwili wood *(Erythrina monosperma)* supposed to belong to *Xyleborus* were somewhat slimy upon the surface and were at first rejected, but later upon being forced to it by necessity were utilized for both feeding and breeding purposes.

This colony at length died out through neglect after about twenty adults had been bred and the species has not since been encountered.

It is evident from the notes above that *Cephalonomia* re-

sembles *Sclerodermus* in its biology, as might be expected from its relationship to that genus.

So far as we have knowledge of the habits of the Bethylidae we may group them in three groups:

(1) The *Epyris* group, in which the adult is markedly fossorial in habits, feeds on sweets as well as upon the juices of the prey, and lays but a single egg per host. The habits of *Epyris extraneus* Bridwell have been worked out by Dr. F. X. Williams, the writer has observed fossorial habits in a South African species, and Williams and the author have observed *Holepyris hawaiiensis*, and Silvestri, an Italian species of this genus.

(2) The *Goniozus* group, in which the adult attacks concealed Lepidopterous larvae and lays several eggs upon them without moving them. These species require saccharine food. Several species of *Goniozus, Perisierola* and *Sierola* are known to attack in this manner. *Laelius* also apparently belongs with these.

(3) The *Sclerodermus* group, in which the adults feed exclusively upon the juices of their prey which they attack in hiding and do not move, and several eggs may be laid upon the prey.

14. A New Genus and Species of Bethylidae from the Hawaiian Islands.

Nesepyris new genus.

Head parallel sided, elongate oblong, greatly prolonged behind the eyes; eyes slightly hairy, ovate; mandibles nearly straight, crossed in repose, bidentate within before the acute apical tooth; antennae 13-jointed; ocelli in an acute triangle.

Pronotum not margined nor furrowed, as long as the mesonotum and scutellum together; mesonotum transverse, lateral furrows abbreviated in front, parapsidal furrows percurrent; scutellum with oblique lateral fossae at base connected by a shallower impressed line; propodeum margined laterally and behind, with an imperfect median raised line; calcaria 1-1-2; ungues simple; posterior tibiae with a few denticles outwardly; wings with closed costal, median and submedian cells; nervulus interstitial with the basal; stigma very short and poorly

developed; metacarpus absent; radius as long as the median, not nearly attaining the wing margin or apex; wings ciliate.

Related to *Allobethylus* but the submedian cell is closed. In Kieffer's tables runs to *Epyris* but the eyes are hairy, the stigma is less developed, the fossae of the scutellum are different, and the propodeum has only a single imperfect median longitudinal ridge.

Type: *Nesepyris ewa* Bridwell.

Nesepyris ewa n. sp.

Length about 3 mm.; length of wing, 2 mm.

Black; mandibles, antennae, tibiae and tarsi yellowish-testaceous; wings hyaline, the venation yellowish.

Clypeus carinate, truncate and thickened at apex; eyes one and one-half times their length distant from the occipital margin, malar space transverse; front with a short impressed line leading up from the clypeal carina; ocelli in an acute triangle, the anterior ocellus five times as far from the eye-margin as from the posterior ocelli, these nearer to each other than to the occiput. Head strongly arched transversely, coarsely tessellate, with short evenly disposed whitish hairs; eyes rather coarsely facetted, with some short scattered hairs; antennae with the scape about half as long as the pedicel, pedicel longer than broad, as long as joints 1 and 2 of the flagellum, these and the rest except the last broader than long.

Pronotum coarsely tessellate, with short evenly disposed whitish hairs, longer than the mesonotum and scutellum together, narrowed about one-half anteriorly; mesonotum with the parapsidal furrows converging posteriorly, ending opposite the oblique fossae at the base of the scutellum, lateral furrows about half as long, minute sculpture more transverse anteriorly, pubescence on the middle lobe like that of the pronotum; surface of the mesopleura similar to that of the pronotum, with a simple rounded fossa; scutellum with the oblique fossae connected by a shallow transverse furrow; propodeum shining, longer than the mesonotum and scutellum together, the sides subparallel, the superior face with the surface punctato-reticulate at base, the apical middle highly polished and shining with the surface malleate, some oblique striae laterally, the sides and declivity highly polished and shining, tessellate with the dividing lines not impressed.

Abdomen ovate lanceolate, depressed; tergites highly polished and shining, tessellate, margins of 3-5 triarcuately depressed as in *Scleroderma*.

Described from two female specimens from the Ewa Coral Plain, Oahu, June 8 and August, 1919 (Bridwell). Type in the collection of the Hawaiian Entomological Society, paratype in the author's collection.

Experiments made with the paratype female indicate that

the species is predaceous upon small lepidopterous larvae, probably those feeding about dead wood.

It is uncertain whether this species is endemic or introduced. The region where it was found is near sea level but harbors many endemic insects because the aridity prevents the spread there of the ant, *Pheidole megacephala,* which destroys most endemic insects where it occurs.

15. Holepyris hawaiiensis (Ashmead) and its Prey.

This species is far more common than its congener *H. hospes* Perkins, being very commonly found about houses and in places where stored food and feeds are kept. Many desultory attempts have been made to breed it by the writer, but without any definite results indicating the nature of its prey. Some observations by Dr. F. X. Williams paralleling those here recorded revealed the fact that it attacks lepidopterous larvae in a fashion quite as characteristic of the *Fossores* as the work of *Epyris extraneus* observed by him.

Neither he nor I have succeeded in breeding the species through from egg to adult, though we have secured oviposition in numerous instances. The lepidopterous larvae worked with by me have been *Ereunetis flavistriata* Walsingham, *Plodia interpunctella* Huebner, and *Corcyra cephalonica* (Stainton) (all determined by Mr. Swezey).

The female lays but a single egg upon a caterpillar, as recorded by Silvestri of one of the Italian species.

An adult taken shortly before noon on Sept. 13, 1919, was placed in a tube and a sugar cane budworm added. At about 3:45 it was attacked and stung in the mouth and then attacked in the head region by the wasp using her mandibles, first at the left antennae and around the labium. By the struggles of the *Holepyris* the larva was turned over and seized by the left leg at the apex of the basal joint. Here she fed for seven minutes. After a time she seized the still fairly active larva, by the labium apparently, and dragged it slowly resisting as much as possible but not very actively, the whole

length of the tube, where she left it for some time. In order to see it while she was seeking a place to hide her prey, I joined two tubes with the original, each successively smaller. She then reversed the larva and dragged it in the same manner as before to the middle of the middle-sized tube, where she left it and retreated part way to the original tube while she rested near by. When she touched it the larva returned toward the smallest of the tubes, leaving her resting. After a few minutes she attacked the larva, now at the mouth of the smallest tube, and attempted to drag it first in one direction then in another, always holding on by her mandibles to the labium of the larva. For a half hour nearly she continued the struggle when she appeared to sting the larva again at the throat and came to rest on the larva longitudinally in front with her head toward the rear of the larva. Ten minutes later the larva escaped from her at the mouth of the smallest tube and retired to the farther end of the largest tube and then returned to the middle, where she found it,, and holding on by its left antenna was dragged by the larva to the middle of the smallest tube, where the larva stopped, though the *Holepyris* attempted to pull it farther, this time by the left antenna. Failing this, she walked slowly along the full length of the larva and back, the larva giving a little jerk at either extremity, then she advanced in front of the larva to the end of the tube, then soon returned and was able to bring it along to the extreme end, but soon it jerked back a little when she walked to its full length again.

All these things took about an hour and at 5 p. m. the observations were suspended.

At 4 p. m. Sept. 15, one egg had been laid, placed longitudinally on the dorsum of the ninth abdominal segment.

By Sept. 18, no other eggs laid on a new larva placed with her. The egg previously laid had dried up. The larva with the female had shrivelled up from her feeding. Placed with two fresh larva in a tube she attacked both, stinging them, and fed upon the leg of one of them, this time the base of the

middle right leg. Afterward she began dragging it about by the mouth as before. Having occasion to transfer her to another tube, I attempted to shake the contents of the tube into another. Severe shaking failed to dislodge her from the larva and the larva being held in the tube by a silken thread, a needle was inserted into the tube and the thread caught upon it and the *Holepyris* and her prey were transferred from the one tube to the other without her losing her hold. The larva during this time was far from being completely paralyzed, only the mouth parts seeming to be incapable of motion. Sometimes she was able to get the larva to move itself in the desired direction, at others it was able to resist her utmost efforts to drag it as she wished.

On Sept. 22, the female had placed one of the two larvae in the narrowed portion of the tube and one egg had been laid, this time on the glass, opposite the dorsal posterior part of the larva. The other larva had been sucked nearly dry. On being placed with fresh larvae, she attacked as before and stung the larva at the throat. She was observed feeding near the anal extremity. Afterward she dragged the larva about as before.

She died soon after without laying further eggs.

This species was common during Dec., 1919, in the warehouses of the Union Feed Company in Kakaako. About two dozen were taken on December 10 to 12 and placed three or four together in test tubes with some larvae of the moths found in stored products there. It was not long until some of them pounced upon the larvae and after a struggle began leading them about as had previously been observed. The wasps did not appear to molest each other, though one passing another at work would seem interested in what it was doing. On the other hand the presence of several larvae in the same part of the tube seemed to cause some confusion on the part of the wasp at work, for sometimes after leaving her prey for an instant she would mistake another larva for the one she had been attacking.

The adult females work diligently manipulating the larvae for food, but they are not able thus to feed themselves as the *Selerodermi* can, but require other food. It has been necessary for me in working with them to feed them with honey in order to keep them alive.

Two males of this species were taken on my office windows and one of these placed with a very large female soon mated with her and mating was repeated several times.

16. Distinction between Holepyris hawaiiensis and H. hospes.

There has always been some difficulty on my part in distinguishing between these species from the descriptions. I have therefore drawn up a summary of the characters by which the females may be distinguished.

I have never seen a male of *H. hospes.*

Holepyris hawaiiensis (Ashmead), Smaller; antennae dusky at tip; punctures of head finer; submedian ridges of propodeum nearer the median, more distinct and shorter; the area lateral to them more finely striate anteriorly and more coarsely posteriorly.

Holypyris hospes Perkins. Larger; antennae not dusky at tip; punctures of head larger and more distinct; submedian ridges of propodeum farther from the median, less distinct; lateral areas more evenly and finely striate.

A New Lowland Plagithmysine Cerambycid from Oahu with Notes on Its Habits (Coleoptera).

BY JOHN COLBURN BRIDWELL.

The insect fauna of the lowlands of the Hawaiian Islands is now made up largely of immigrant forms brought in through the operations of commerce. With the advent of the European and Asiatic races in the islands and the introduction of the cultivated plants and weeds and the development of herds of cattle the native vegetation began to disappear from the lowlands, surviving only on some of the

dry ends of the lower spurs of the mountains, in the sides of the gulches, in the marshes, along the sea shore and in some of the more arid regions where the lack of surface water checked the wanderings of the cattle.

The endemic insects, being as a rule but little adaptable to new host plants, receded with the plants to which they were attached.

With the spread of cultivation and the introduction of hundreds of species of plants for economic purposes or for ornamental plantings for many years entirely without any system of port examination and quarantine, many insects attached to these plants were introduced and became established. Some of these entered into direct competition with endemic lowland insects. Other insects, however, which were parasitic and predaceous upon the introduced insects soon adapted themselves to attack the endemic lowland insects and reduced their numbers. Among these one species is doubtless more important than all the rest. The ant, *Pheidole megacephala,* is eminently predaceous in its habits, attacking other insects indiscriminately and wherever it has spread the endemic insect fauna has practically disappeared, only a few Hymenoptera, such as species of *Crabro, Odynerus* and *Nesoprosopis,* some Coccidae, Jassidae, and Delphacidae among the Homoptera, some Heteroptera, some Lepidoptera and possibly some Diptera have been able to survive where this ant is able to maintain itself in its full numbers. But none of the characteristic groups of endemic Coleoptera are able to persist where it is found since they are generally sluggish, of feeble powers of flight, and defenseless against the attacks of the myriads of ants present in the cultivated area of the islands.

It has been generally recognized that the cooler and generally damper climate of the mountains forms an impassable barrier to the spread of *Pheidole,* but it is not so well known that there are certain of the dryer areas of the lowlands in which it is unable to maintain itself. Since these

regions are also the ones upon which the native lowland vegetation has persisted it is natural that the native insects should survive here, if at all.

On the Island of Oahu, these arid regions are found at the extreme southeastern end in the vicinity of Makapuu point, and again on the western side of the island from Kaena point along the Waianae coast to Barber's point, and thence eastward to near the Pearl River Inlet. In general these regions are difficult of access, without good roads and without water, so as to make camping difficult, and the surface is irregular and difficult of passage for pedestrians, owing to the growth of the glue *(Acacia farnesiana)* and algaroba *(Prosopis juliflora)* which cover their surface. The native vegetation is scattered and as a rule there is but little to repay the insect collector for his trouble in working there. Such conditions have led to a very general neglect by entomologists of these regions and they have been but little investigated excepting the Waianae coast and the vicinity of Koko Head.

In 1916, Mr. C. N. Forbes, the botanist of the Bishop Museum, called my attention to the region to the south of Ewa Mill and Sisal as a region where some of the endemic lowland plants have survived, and in November of that year the writer acompanied him on a collecting trip there.

He was rewarded by finding there an undescribed Jassid of the genus *Nesophrosyne* attached to a form of *Euphorbia multiformis* growing there, and rediscovered the endemic *Plutella albovenosa* Walsingham, discovering the feeding habits of its larva. It is attached to the endemic caper, *Capparis sandwichiana,* the young larva mining under the cuticle of the green fruits, while the older larva burrows in its fleshy walls, emerging to spin a characteristic *Plutella* cocoon.

In 1918 Mr. O. H. Swezey and Mr. P. H. Timberlake visited the same region, finding there the Conoiopterygid, *Coniocampsa vesiculigera,* which has rarely been taken. The writer again visited the region on June 8 and 10, 1919, finding a new Plagithmysine Cerambycid, described on a later page

as *Neoclytarlus euphorbiae* and *Proterhinus deceptor* Perkins which had previously been taken by Mr. Timberlake on Diamond Head. Both belong to particularly characteristic endemic Hawaiian groups of beetles and are the first species of these groups to be discovered on the lowlands. Material was brought in from which a second endemic species of *Plutella* attached to *Capparis sandwichiana* described elsewhere in these Proceedings as *P. capparidis* by Mr. Swezey, and a new Bethylid representing a new genus, described in another paper as *Nesepyris ewa.*

On June 30, 1919, Mr. O. H. Swezey, Mr. E. H. Bryan, Jr., and the writer visited the same general region, going by train to Gilbert and walking by one road to the lighthouse at Barber's Point, returning by another route to Gilbert, finding some endemic Delphacids, a Jassid attached to *Myoporum* and an *Oliarus* which had previously been taken by Mr. Swezey at Ewa Mill and the only lowland species of the genus known from these islands. Here also was taken a second species of *Proterhinus* (*P. excrucians* Perkins).

The writer visited the region near Sisal again on July 6, 1919, and many times subsequently during 1919.

These are apparently the only entomological investigations which have been made in this region. which for the want of any comprehensive name the writer has called the Ewa Coral Plain. The results of these visits have been so interesting and since the region promises to furnish further members of the old lowland fauna, it is worth while to discuss the conditions there somewhat fully.

The Ewa Coral Plain is made up of an old coral reef which extends from the Pearl Harbor Lochs and the inlet connecting them with the sea to Barber's Point for a distance of about eight miles, extending inward from the sea for a mile and a half to two miles. Nearly parallel to the southern shore and about a mile from it, extends an old solid barrier reef in which are the characteristic pits such

as are found in the fringing reefs at Kewalo and Waikiki, and generally where coral reefs lie near the surface. These pits are of varying sizes. They may be only a foot or so wide, even fifteen feet in depth and in the larger ones there are traces of the bread-fruit, the paper mulberry, the ti, yams, noni, native sugarcane, and other plants such as *Ipomoea tuberculata* and *Cassia Gaudichaudii,* which may have been under cultivation.

From the first old reef, which seems to lie near where the contour of 40 feet is located on the topographical map, the surface slopes gradually down to the sea, successive reef formations may be noted. On some portions of the plain, particularly toward the east, the surface has sufficient soil for the cultivation of sugar-cane, and in other places sisal has been planted, but west from Ewa Mill and from about a half mile south of the Oahu Railway and Land Company's tracks to the sea, the surface is covered with a growth of glue, algaroba and scrubby lantana, in places quite dense, but generally a straggling growth on account of the scanty rainfall. This region is utilized to some extent as rough pasture for cattle and many colonies of bees are maintained where the algaroba trees are denser and larger.

Among the growth of algaroba and glue are the scanty remnants of the lowland flora which furnish a refuge for a remnant of the old lowland faŭna of insects. Among these are a variety of *Myoporum Sandwicense, Erythrina monosperma,* sandal wood, *Acryanthes splendens, Capparis Sandwichiana, Portulaca villosa, Sida,* and perhaps most important from the entomological point of view, is the *Euphorbia,* which Mr. Forbes considers a variety of *E. multiformis.* It is to this plant which *Neoclytarlus euphorbiae* and some other lowland endemic insects are attached.

This *Euphorbia* is a low, freely branching shrub which has a short trunk, rarely more than an inch in diameter, which rapidly disappears into a multitude of branches and twigs,

the whole plant rarely reaching a height of more than two and a half or three feet.

This plant, like others in the locality, has considerable powers for resistance to drought, for here many months may pass between rains. Under such circumstances, the *Euphorbia* may lose its leaves and remain leafless. Branches broken down but not entirely separated from the parent plant may have their wounds closed with the copious milky juice and callous over without dying.

Neoclytarlus apparently does not attack the living plant but only the freshly dead stems before they are too much weathered. It is probable that the conditions prevailing in this region furnish this insect more material to breed in than ever was available before the natural conditions were changed. The season of 1919, having been abnormally dry led to the death of an unusually large number of the plants. Three things were observed killing the plants or putting their branches in condition for *Neoclytarlus* to breed in.

An armoured scale, as yet undetermined, occasionally becomes numerous enough at the base of the plant to kill it. Even if it does not kill the plant it may so weaken it that the immigrant Cerambycid, *Lagocheirus obsoletus* Thomson,may attack the weakened stems. This species frequently attacks the plant and completes its transformations after destroying the main stem and branches while the plant is living, the finer twigs being still green and flowing with the milky juice. The attack, however, ultimately results in the death of the plant and its utilization by the *Neoclytarlus*. Many plants unfavorably situated may be so weakened by drought as to fall victim to these beetles without previous injury by the scale insect. The presence of cattle on this area results in a great deal of mechanical injury through their trampling, many branches being broken off and the whole plant often broken down, yet putting many branches in condition for the *Neoclytarlus* to breed in. Whatever the cause of dying may be, the *Neoclytarlus* utilizes a plant quite thoroughly before it has time to

weather, so as to be no longer attractive to it. They utilize not only the larger branches and trunks but they may be found in the branchlets no more than an eighth of an inch in diameter. They feed first in the bark and sap wood and then make their final borings and pupal chambers deep in the wood where they close themselves in with the finely comminuted wood, as is not uncommon with Cerambycidae. Besides the *Lagocheirus* and the *Neoclytarlus,* the immigrant *Prosoplus bankii* (Fabricius) also attacks the *Euphorbiae* wood and competes with the *Neoclytarlus* for its food. The finer branchlets, too small for them to use, are utilized by two or three small Scolytid beetles of the genus *Hypothenemus* or its allies.

The size of the beetles varies greatly, individuals breeding out from the main stem and branches being usually larger than those from the branchlets. Apparently they are also smaller where the wood fed upon has been dried than where it is moister.

The adults mate soon after emerging, within 24 hours, and oviposition begins at once. Mating is frequently repeated, the female ovipositing while accompanied by the male and very frequent mating takes place between the acts of oviposition. One female observed mated more frequently than she deposited eggs and was almost constantly surmounted by one of several males. She was very much averse to leaving the *Euphorbia* wood in proper condition placed with them and when not in copulation was constantly feeling about with the end of her abdomen in search of suitable crevices in which to oviposit. She was observed to oviposit in a patch of shredded wood formed by the larva of *Prosoplus* and on examination three eggs were found. These were fusiform, dull white, approximately .742 mm. long by 318 mm. wide, the end by which they were attached being a little more elongate than the other. The distal end is strongly reticulate, the rest smooth. Apparently the eggs are held in place by some slight cementing material.

In mating the male grasps the female with his front legs, which usually hold her near the middle legs, and walks when

necessary with the hind and middle legs. The tip of the abdomen is bent down in both sexes and after some manipulation the female straightens out the tip of the abdomen, extends the long hidden terminal segment and intromission follows. The male during intromission keeps in constant up and down motion on the hind legs as a pivot bending the head, prothorax, and tip of the abdomen. Separation appears to take place in response to movements of the long last segments of the female in search for suitable places for oviposition.

The combats between the males seemed very mild, males disputing possession of a female with the one in possession being fought away with the hind and middle legs and if persistent to some extent with the jaws. If the male had been in possession for some time, however, he seems often to give up the struggle readily. It was noticeable that at first in a tube containing a large male and several smaller ones and only a single female, the large male was able to keep possession for a considerable time but was finally replaced by smaller ones.

The adults paid no attention to honey placed with them for food. Mating and oviposition continued from early in the afternoon, when they were first placed under observation, until sundown at least, and indeed throughout the next day.

Eggs laid June 13 at about 2:30 p. m. were not hatched on June 16 but were found to have hatched by 10 a. m. June 18, and the young larvae found in the tube where they had been placed, escape from the egg having taken place through a slit in the proximal end. The first instar larva is legless, not unlike the older ones, and the middle of its body, its empty mid-gut constitutes a large airspace.

From eggs laid in the laboratory during July, adults were secured in 52 days, the indoor breeding indicating about two months as the usual time required for the development from egg to adult.

From the branches of *Euphorbia* brought in to breed out

the *Neoclytarlus* many individuals emerged of an immigrant *Hormiopterus* (Braconidae) described on another page as *H. vagrans.* This species attacks the larvae of the *Neoclytarlus* while feeding near the surface and the full grown larvae spin their cocoons in a mass in the borings of the beetle, emerging through a circular emergence hole. This species is generally distributed in the lowlands of Oahu.

From the material of *Euphorbia* attacked were found numerous examples of the immigrant Bethylid *Sclerodermus immigrans* Bridwell which furnished the material for the further studies upon this species published on another page of these Proceedings.

There was also found attached to this species a large species of *Eupelmus,* apparently endemic and undescribed.

Neoclytarlus euphorbiae readily oviposited and bred in the wood of the native species of *Euphorbia* so that a constant and dependable supply of larvae was obtained for use in the studies made of the biology of the species of *Sclerodermus.*

This species is the first characteristic species of the group called *Clytarlus* by Dr. Sharp in the Fauna Hawaiiensis of which the food plant is known which is not attached to one of the legumes, *Acacia koa* or *Sophora chrysophylla.*

The name *Clytarlus* will unfortunately have to be given up for this genus since none of this group were included under the name in the first paper (Trans. Ent. Soc. Lond. 1878:206) in which it was employed, the only species there included being *Clytarlus robustus* Sharp=*Plagithmysus pulverulentus* Motschulsky, the type of the genus *Plagithmysus* and *cristatus* Sharp since referred by Dr. Sharp to *Callithmysus.* In order to avoid any further shifting of names, the former species may be designated as the type of *Clytarlus* Sharp 1878 and being thus isogenotypic with *Plagithmysus,* this genus must fall as a pure synonym. *Clytarlus* Sharp 1896 with *fragilis* as type thus is without a name and for it *Neoclytarlus* is suggested. Aurivilius in Coleop. Catal. 29:387, 1912, has merged all the Plagithmysine genera of Sharp into *Plagithmy-*

sus and with the discovery of additional connecting forms much can be said for this course. But whether we consider them as genera or subgenera the groups will still require names.

Neoclytarlus euphorbiae n. sp.

Allied to *N. fragilis* and *N. ultimus* but is less depressed in form and much darker in coloration.

Dull black; coxae, base of tibiae, and femora, and frequently the base of the scape and a band beyond the middle of the hind tibiae, apical 6 or 7 antennal joints and base of others pale testaceous (the apical joints of the antennae more brownish); with rather whitish pubescence on the head, thorax, and abdomen, and on the clubs of the femora; on the elytra the pubescence is absent in two oblique irregular bands, one before the first, and one before the second third of their length, and the pubescence is much thinner near the apices of the elytra. Usually three transverse ridges on the pronotum, the anterior one not so near the margin as in *fragilis;* usually the pubescence is absent on the prominences of the sides of the upper surface of the pronotum forming an irregular longitudinal stripe there.

The apices of the elytra are obliquely truncate within and less rounded than in *fragilis.* Punctures of pronotum and elytra finer than in *fragilis.* Club of femora as in *fragilis,* elytra not particularly elevated near the scutellum.

Male antennae longer, the apical joints much longer than in the female, Last abdominal segment emarginate but less so than in *mediocris* as figured (Fauna Haw. 3: pl. 6 f. 16).

Length of type and allotype: 10 mm..; length of smallest specimens of either sex: 5 mm.

Described from a series of 97 females and 107 males bred from the wood of *Euphorbia multiformis* from Ewa Coral Plain, Oahu, at an elevation of about fifty feet above sea level, June to November, 1919 (Bridwell).

Type male, allotype female, and paratypes in the collection of the Hawaiian Entomological Society. Paratypes in the Bishop Museum, the collection of the Hawaiian Sugar Planters' Association and in the private collections of P. H. Timberlake and of the author.

NOTES AND EXHIBITIONS.

Cryptorhynchus mangiferae.—Mr. Swezey recorded obtaining the mango weevil from mango seeds received from Wai-

luku, Maui. This is the first record of this insect on Maui.

Plusia pterylota.—Mr. Swezey exhibited a specimen of this rare moth given him by Brother Matthias Newell who had caught it in Hilo. Brother Matthias stated that this moth had been described under the name *newelli,* by Dr. Perkins, from specimens which he had given him from Hawaii. In the Fauna Hawaiiensis, however, it appears under the name *pterylota,* from Oahu. It was not recorded in literature from Hawaii until later.

Bruchid in monkey-pod seeds.—Mr. Swezey exhibited four specimens of a Bruchid bred from a seed of the monkey-pod tree. The seed was taken from a pod picked up at the Waipio Substation June 10th. There was a hole in the pod and the seed was found to have several eggs on it. Recently these Bruchids have issued from the seed. The species appears to be new to the Islands.

Leafhoppers from Barber's Point.—Mr. Swezey recorded the capture of the following leafhoppers at Barber's Point near the sea coast on the Ewa Coral Plain, June 29th, 1919:

Aloha myoporicola, on *Myoporum sandwichensis.* (First record of this insect from Oahu.)

Nesophrosyne sp., this Jassid on the same host. (Previously collected only on Hawaii.)

Oliarus sp., on the same host. (Previously collected at Ewa Mill and in Manoa Valley.)

Ilburnia leahi, on beach form of *Lipochaeta.*

Kelisia sporobolicola, on *Sporobolus virginicus* growing in marshes and sandy places.

Tasmanian insects.—Mr. Ehrhorn exhibited a collection of insects recently received from Tasmania. He also gave some account of a recent trip to California.

Kelisia eragrosticola.—Mr. Timberlake exhibited specimens of this *Kelisia,* of which he and Mr. Bridwell took a large series from *Eragrostis* on Kalihi Ridge at about 1000 ft. elevation, on June 15th. The species was described by Muir from

specimens found in Iao Valley, Maui, by Giffard and Fullaway. He also reported that he had found *K. swezeyi* on *Eragrostis* further up Kalihi Valley several years ago.

Nesocymus on *Eragrostis.*—Mr. Timberlake exhibited a Lygaeid collected on *Eragrostis* on Kalihi Ridge, June 15th. It is an apparently new species and belongs in *Nesocymus.* Mr. Bridwell had taken a single nymph on Manoa Ridge a few weeks previously, and reported that he had taken the species on *Sporobolus* at Barber's Point a few days later.

Pseudococcus saccharifolii.—Mr. Timberlake reported finding this mealy bug and its parasite, *Pseudococcobius terryi*, on the same day in Kalihi, likewise on *Eragrostis variabilis*, and that several more of the parasites were reared from material collected at that time. He also reported that Mr. Bridwell had collected a specimen of *terryi* recently on Manoa Ridge, and that neither the mealybug nor parasite had previously been taken except on sugar-cane.

Anagyrus from *Antonina indica.*—Mr. Timberlake exhibited specimens of a new *Anagyrus* recently reared from *Antonina indica* occurring on Bermuda grass collected at the corner of Lunalilo and Victoria Streets, Honolulu. One male was also reared the preceding January from the same host from Kaimuki. It is undoubtedly a new immigrant.

Eupelmus subsetiger.—Mr. Timberlake exhibited a specimen of this Eupelmid, which was taken by sweeping lantana and weeds along the Bowman trail, Kalihi Valley, about 200-300 ft., on June 15th. The species appears to constitute a new genus and is apparently endemic, as a closely related species was found by Dr. Perkins at Kilauea, Hawaii.

Nesophrosyne on Euphorbia.—Mr. Bridwell reported finding the *Euphorbia Nesophrosyne* frequenting palnts without leaves on the Ewa Coral Plain.

Tramea lacerta.—Mr. Bridwell noted this species as common at the present time on Ewa Coral Plain, almost as common as the other species of immigrant dragonflies. It is very

abundant at Barber's Point near the coast. He commented on the general scarcity of this species previously.

Coniocompsa vesiculigera.—Mr. Bridwell recorded collecting on the Ewa Coral Plain three or four specimens of this small Coniopterygid. The species was taken two or three times when first noticed a few years ago, and again last year at this locality by Mr. Swezey.

Cephalonomia sp.—Mr. Bridwell also recorded finding the small black *Cephalonomia,* reported at last meeting from the brackish marshes at Waikiki, in twigs of *Euphorbia* from the Ewa Coral Plain, and rearing the same from the larvae of *Hypothenemus* or related Scolytids. It was not known whether the species has been described or not.

Plutella capparidis.—Mr. Bridwell recorded finding a new species of *Plutella* feeding on the surface of *Capparis* leaves and doing a small amount of mining. It is distinct from *maculipennis* and *albovenosa* and Mr. Swezey has described it as *Plutella capparidis.**

Proterhinus on Sida.—Mr. Bridwell recorded finding specimens of a *Proterhinus* while sweeping Sida plants on the Ewa Coral Plain. It proves to be the same species taken by Mr. Timberlake on *Lipochaeta* on Diamond Head. (Later determined by Dr. Perkins as *P. deceptor*).

Proterhinus on Ipomoea.—Mr. Bridwell recorded collecting a species of *Proterhinus* from dead stems of *Ipomoea bonanox* on Tantalus, June 22nd. Five adult specimens and larvae were recovered. It seems to be the same species previously reared from *Clermontia.* (Later determined by Dr. Perkins as *P. vestitus*).

New Cerambycid.—Mr. Bridwell exhibited specimens of a Cerambycid beetle belonging to the subfamily Lamiini, which appears to be new to the islands. It resembles *Prosoplus bankii* but has two carinae on the base of the elytra. The

*See page 382 for description. (Ed.)

specimen was collected in Honolulu by Mr. J. A. Kusche.

Lagocheirus obsoletus.—Mr. Bridwell also recorded rearing *Lagocheirus obsoletus* from *Pseudopanax* and *Euphorbia.* It has previously been reared from Ceara rubber, Allamanda and Kukui.

Prosoplus bankii.—Mr. Bridwell recorded rearing *Prosoplus bankii* from twigs of *Euphorbia.* It has previously been reared from *Crotalaria,* various leguminous vines and klu pods. It is very common on the Ewa Coral Plain.

Coptops aedificator.—Mr. Bridwell recorded rearing this beetle from breadfruit tree, finding the larvae under the bark.

Bruchus sallei.—Mr. Bridwell recorded finding *Bruchus sallei* in Kalihi. It had not previously been found west of Nuuanu Valley.

AUGUST 7th, 1919.

The 167th meeting of the Society was held at the usual place, Vice-President Crawford presiding. Other members present were Messrs. Bridwell, Fullaway, Osborn, Rosa and Bryan.

The minutes of the previous meeting were read and approved with corrections.

Mr. Edwin H. Bryan, Jr., was elected to active membership.

NOTES AND EXHIBITIONS.

Tortricid from almond.—Mr. Fullaway exhibited an unidentified Tortricid moth reared from an almond nut.

Malachiid beetle.—Mr. Fullaway exhibited a specimen of a beetle new to the islands, belonging to the family Malachiidae, captured July 16th, 1919, in an insectary at the Government Nursery, Honolulu.

Calandra linearis var. *striata.*—Mr. Bryan reported finding

the tamarind weevil very numerous in the pods and seeds of the tamarind tree growing in the yard of the Central Union Church. In the same pods were found a great many of the larger tamarind weevils (*Caryoborus gonagra*). A species of Bethylid (*Perisierola*) was also found, which seemed to be parasitic on a small pink caterpillar. The caterpillar lived, however, forming a cocoon, from which a small moth emerged, determined by Mr. Swezey as *Myelois ceratoniae*.

MISCELLANEOUS NOTES BY MR. BRIDWELL.

Euscelinus peregrinus.—This species has been reared from *Sinoxylon conigerum*.

Ischiogonus palliatus.—This parasite was secured from a koa log with larvae of *Plagithmysus pulverulentus*. Two or three lots were also reared from *Neoclytarlus*. It requires two to three weeks from egg to adult.

New Food Plant of Pink Boll Worm.—On July 4th, in Nuuanu, above pumping station, *Hibiscus youngianus* was found. The dry pods contained a pupal skin positively determined by Mr. Swezey as that of *Pectinophora gossypiella*. It is worthy of note that Hillebrand in his Flora of the Hawaiian Islands, p. 51, in a note on *Gossypium* (now *Kokia*) *drynarioides* Seeman says: "The ripe seeds are mostly spoiled by worms, for in consequence of the imperfect dehiscence of the capsule they are retained an undue length of time." It is probable that the injury referred to was caused by *Pectinophora*.

Schistocerus cornutus.—This Bostrychid was found boring in twigs of small diameter. The eggs are deposited in the bottom of the burrow; the larvae continued to burrow further down; in this way the insect serves as a twig-pruner. Kiawe twigs have often been found following the recent storm completely destroyed in this way. Somewhat similar work is done by *Sinoxylon*, but *Sinoxylon* frequently uses considerably larger wood, while the bulk of *Schistocerus* bores comparatively small

twigs. It has been found in *Euphorbia,* dead hibiscus, bamboo, dead dry sugar cane, etc. It makes a characteristic noise in working.

Eupelmus species.—A large species of *Eupelmus* was reared from *Neoclytarlus,* probably new, and one of the largest species found.

Gordius.—Mr. Bridwell also exhibited a specimen of this parasitic worm infesting caterpillar in dead ieie stem.

Trypoxylon bicolor.—He also reported finding nests of *Trypoxylon bicolor* in the mountains since 1915, but few on the lowlands. The cocoon is long and tapering and separated from the container; at the bottom is a well in which the meconium is left so that it does not contaminate the larva.

SEPTEMBER 4th, 1919.

The 168th meeting of the Society was held at the usual place. Messrs. Timberlake, Williams, Willard, Grinnell, Pemberton, Osborn, Rosa and Bridwell present. No officers being present, Mr. Pemberton was chosen as Chairman and Mr. Bridwell as Secretary pro tem.

The minutes of the previous meeting were read and approved.

NOTES AND EXHIBITIONS.

Eristalis aeneus.—Mr. Osborn reported *Eristalis aeneus* being taken by Mr. Swezey dead in a window in one of the H. S. P. A. Experiment Station buildings. He exhibited five individuals he had subsequently taken upon the Station grounds Aug. 29th-Sept. 3rd, 1919. Mr. Bridwell reported having taken one speciment near Sisal on the Ewa Coral Plain, Sept. 30th, 1919. This species has not previously been reported from the Hawaiian Islands.

Itonidid.—Mr. Osborn also exhibited Itonidid flies bred from larvae associated with and feeding upon the sugar

cane aphis at Waipio, Oahu. One larva was observed sucking the juices from the leg of an aphis.

Pachyneuron anthomyiae.—Mr. Timberlake exhibited two specimens of *Pachyneuron anthomyiae* Howard, bred by Mr. Osborn from *Leucopis nigricornis* from the H. S. P. A. Station grounds. This is the first record of the species in the Hawaiian Islands. It is the third or fourth species of the genus now established in Hawaii.

Deinomimesa haleakalae.—Mr. Timberlake exhibited and gave notes upon the habits of *Deinomimesa haleakalae,* which he had found abundantly at the edge of the forest on Mount Haleakala, Maui, at elevations of about 5,000 feet. He observed females carrying adults and nymphs of species of the Jassid genus *Nesophrosyne,* which they were storing in their nests. They burrow horizontally in low banks along the trails. He was, however, unable to dig them out since the nests extended several inches into the stiff, clayey soil. A species of *Crabro* was found nesting in the same banks.

Short-winged Jassid.—Mr. Timberlake exhibited specimens of a short-winged flightless Jassid, possibly representing a new genus, taken by him on Mount Haleakala upon a native grass, not yet determined, at elevation of 7,000 feet.

Coelopencyrtus swezeyi.—Mr. Timberlake exhibited specimens of *Coelopencyrtus* bred by him from the larvae of *Odynerus nigripennis* taken by Mr. Swezey at Kealakekua, Kona, Hawaii, at an elevation of about 3500 feet. One hundred and forty females and two males were reared from a single larva of the *Odynerus.*

Xanthoencyrtus fullawayi.—Mr. Timberlake exhibited two specimens of *Xanthoencyrtus fullawayi* reared by him from *Pseudococcus saccharifolii* taken at Naalehu, Hawaii. These are the third and fourth specimens of the species known.

New Locustid.—Mr. Pemberton exhibited a specimen of an undetermined Locustid supposed to be new to the Hawaiian Islands, taken by him at light at Hilo, Hawaii, on July 25th,

1919. Brother Matthias Newell has since reported to him the finding of an additional specimen at Hilo.

Trox sp.—Mr. Pemberton exhibited a specimen of a small undetermined species of *Trox* taken by him at Hilo, Aug. 24th, 1919. This may be the species recorded by Perkins, also taken near Hilo.

Cylene crinicornis.—Mr. Pemberton reported observing the algaroba borer (*Cylene crinicornis*) feeding in numbers upon the juice in the pits on the surface of the young fruit of the Noni (*Morinda citrifolia*) from which the flowers had recently fallen.

Sclerodermus tantalus.—Mr. Bridwell reported taking recently at the Nuuanu Pali an additional individual of *Sclerodermus tantalus,* previously known only from the unique type. *S. chilonellae* was recently taken on the Waianae coffee plantation in dead wood of coffee associated with larvae identified by Mr. Swezey as those of a species of *Semnoprepia.* Neither of these insects has previously been observed in the wood of introduced plants. *S. chilonellae* has not previously been taken in the Waianae Range.

Silaon rohweri.—Mr. Bridwell exhibited the larval food and cocoons of *Silaon rohweri,* recently discovered by him at Waianae village. The present material was found near Sisal on the Ewa Coral Plain in the pupal chambers of *Neoclytarlus euphorbiae.* The larval food consists of nymphs, apparently of a Lygaeid bug, *Nysius* sp.

Crabro unicolor.—Mr. Bridwell reported finding at the Nuuanu Pali numerous cells of *Crabro unicolor* stored almost exclusively with adults of *Ceratitis capitata.* Aside from these, two individuals of the lantana gall fly and two large Drosophilid or allied flies were the only other species represented. From 8 to 14 flies were stored in a cell and the material contained perhaps three hundred flies. The locality where they were found was on the leeward side of the ridge north of the road, where the flies, caught up by the wind on the

guava-covered windward slopes of the mountains, would be likely to be found. The locality is notorious for the force of the wind. Mr. Williams has previously reported finding a single nest of *Crabro tumidoventris* in a somewhat similar locality at a higher elevation stored with *Ceratitis capitata*. The utilization of this fly by these native wasps is noteworthy. Probably the natural slowness of flight is increased in these localities by the effect of the wind and the lower temperature.

Bruchus limbatus.—Mr. Bridwell reported that the Bruchid recently bred by Mr. Swezey from the seeds of the monkey-pod (*Samanea saman*), is apparently *Bruchus limbatus* Horn, previously known from Southern California, and Lower California to Texas, and has been bred from *Siderocarpus flexicaulis* and an undetermined chaparral plant known as *tenaza*. He has found it at Makiki Heights, where it had bred from eggs laid on the pods. He had bred it in numbers from eggs laid upon the seeds.

Newly imported insects from Australia.—Mr. Williams reported the liberation at Mountain View, Hawaii, of colonies of the Carabid enemies of the sugar cane leaf hopper recently brought by him from Australia. These colonies consisted of:

68 *Drypta australis,* Dej.
2 *Drypta mastersii* Macleay.
66 of a green *Drypta.*
4 *Chlaenius* beetles with yellow spots. For cutworms.

There were also liberated at Waipio, Oahu, the following Aphis enemies, also from Australia:

30 adults of *Coccinella repanda.*
28 adults of *Coccinella arcuata.*
3 adults of a Syrphid.
6 green *Chrysopa* sp.

A Hemerobiid, *Micromus,* was liberated in numbers at Wailuku and Lahaina, Maui, and at Waipio, Oahu, and Honolulu Experiment Station grounds (6 specimens), Oahu. One female *Paralastor* wasp was liberated at the Station grounds,

Honolulu. Four specimens of a black *Chelonus* wasp and 4 specimens of a small *Onthophagus* beetle were liberated in Honolulu and at Wahiawa respectively by D. T. Fullaway. The Coccinellids are also being bred in the laboratory. All this material was recently brought by Mr. Williams from Herbert River, Northern Queensland.

Syrphid flies from California.—Mr. Osborn reported the breeding and liberation of a mixed colony of about 60 adults of *Eupeodes volucris, Syrphus americanus* and possibly other species. These were first placed in a large cage containing aphids on cane in order to give opportunity for mating, and then released on the H. S. P. A. Station grounds. This material was forwarded from the California State Insectary at Sacramento.

OCTOBER 2nd, 1919.

The 169th meeting of the Society was held in the usual place, President Giffard in the chair. Other members present: Messrs. Bridwell, Bryan, Ehrhorn, Osborn, Rosa, Swezey, Timberlake and Williams.

In the absence of the Secretary, Mr. Bridwell was appointed Secretary pro tem.

Minutes of the previous meeting were read and approved.

PAPERS.

The Tahiti Coconut Weevil, Calandra taitensis Guerin, in Hawaii.

BY O. H. SWEZEY.

This insect was described from Tahiti in 1840, by Guerin, in Iconographie der Regne Animal, page 171, and figured on plate 30, Fig. 4.

Doane, in Notes on Insects Affecting the Coconut Trees of

the Society Islands (Journ. Econ. Ent., 2, pp. 220-223) describes the work and habits of the larvae.

An account of this weevil is also given by Zacker in Die Schädlinge der Kokospalmen auf den Südseeinseln (Arbeiten aus der Kaiserlichen Biologischen Anstalt fur Land- und Forstwirtschaft, IX, p. 100, 1913). He says it is not found elsewhere.

I have not found any record of its occurrence elsewhere, but in the collection of Samoan insects received by Mr. Giffard from Dr. H. C. Kellers, is one specimen of this weevil labelled: Tutuila, Samoa, 900-1200 feet, inland, 1918.

August 13th of this year, Mr. Timberlake secured a specimen of this beetle while sweeping on grass beneath tall coconut trees at Honaunau on the western coast of Hawaii. Searching further for specimens, both he and I collected quite a series of them from younger coconut trees growing nearby. The larvae were also found in abundance where they were feeding in the leaf petioles. The beetles themselves were most readily found on cut-off ends of petioles, tho they were also found beneath the fibrous layers covering the trunk of the tree.

The presence of the larvae was indicated by the conspicuous gummy exudation from small holes near the margins of the petioles towards their bases. This was in living leaves, and they apparently were not particularly injurious, for the grove of growing coconut trees was in as fine condition of growth and appearance as is ever seen. That the weevil has been present at the place for some time (perhaps several years) is indicated by the presence of the holes caused by the larvae on old dried-up leaves near the base of the young trees.

On August 18th, I found evidence of the occurrence of this weevil on coconut trees at Honuapo on the south coast; and on August 21st at Kailua; and Sept. 5th at Kawaihae. Thus indicating its distribution on the whole leeward coast of the Island.

On August 31st, I made quite a search on coconut trees in

and near Hilo, but without finding any traces of the presence of the weevil. Since that time, I have also searched for it on coconut trees in Honolulu, at Waikiki, and at Moanalua, without finding any evidence of it. Perhaps it is not present on the Island of Oahu. If so, it furnishes an example of an insect immigrant becoming established first on another Island of the group than the one containing the main port, Honolulu. The method of its arrival is a subject of conjecture, especially as, where it is present on the Island of Hawaii, is the opposite side from Hilo, the main port, where it is not to be found.

Specimens were sent to Dr. Guy A. K. Marshall of the Imperial Bureau of Entomology, who confirmed the identification of the species and its being distinct from *frumenti,* the species on coconuts in the Philippines and the Malayan and Asiatic regions.

The Genus Phytometra (Plusia) in Hawaii (Lepidoptera).

BY O. H. SWEZEY.

Two immigrant species have been known in the Hawaiian Islands for some time: *chalcites* Esper and *biloba* Stephens. Both are listed under *Plusia* in the Fauna Hawaiiensis, I, page 159, 1899. The former is quite a cosmopolitan species and a garden pest. It is found abundantly throughout the Hawaiian Islands and even on Midway Island. *Biloba* is an American species and is only rarely collected here, but is probably on all the islands, having been collected at Kona, Hawaii; Haleakala, Maui; and on Lanai by Dr. Perkins; at Kilauea, Hawaii, by Mr. Giffard; and at Halemano, Kauai, by Mr. J. A. Kusche.

P. pterylota Meyrick was the first endemic species discovered. It was described in the Fauna Hawaiiaensis, III, Pt. IV, page 348, 1904, from a single male specimen collected by Dr. Perkins on Mt. Tantalus, Oahu The female was first colected at Kilauea, Hawaii, by Brother Matthias Newell.

Dr. Perkins, to whom this specimen was given, at first thought it a distinct but closely allied species and drew up a description under the name *P. newelli* after its discoverer. This name was never published, however, for, as Dr. Perkins has written me recently, when he gave the specimen to the British Museum several years ago, Sir George Hampson determined it as the female of *pterylota*. It is recorded in the Catalogue of the Lepidoptera in the British Museum, XIII, page 453, 1913, where both sexes are described and the male is figured. The habitat as given there is incorrect. Instead of "Hawaii, S. S. Korlan Range, 1 ♂ type; Kilauea (Perkins), 1 ♀," it should be corrected to read "Oahu, S. E. Koolau Range (Mt. Tantalus), 1 ♂ type; Hawaii, Kilauea (Newell), 1 ♀."

An occasional specimen of this species has been taken of recent years by Mr. Giffard at lights at his bungalow near Kilauea, Hawaii; and Brother Matthias has recently presented me with a specimen taken at Hilo, Hawaii. On September 14th of this year, Mr. Williams collected a specimen on the ridge at the south side of Iao Valley, Maui. This is the first record of its capture on that island.

P. giffardi Swezey was described in Proceedings of the Hawaiian Entomological Society, II, page 234, July, 1913, from specimens collected at light by Mr. Giffard at his bungalow near Kilauea, Hawaii, in 1911 and 1912. A specimen was collected previously, however, on Maui, by the late F. W. Terry. This specimen was sent to the British Museum, and has since been described as *Phytometra psectrocera* and figured by Sir George Hampson in the Catalogue of the Lepidoptera in the British Museum, XIII, pages 453 & 454, Dec., 1913. The habitat there given should read "Kaupo Trail," instead of "Campo Trail." Comparing speciments of *giffardi* with the description and figure of *psectrocera,* I find them to agree, hence, as both species were published in the same year, and *giffardi* earlier in the year than *psectrocera,* the latter will be a synonym of the former.

Mr. Giffard occasionally secures more specimens of this

moth from the same locality at Kilauea as given above. There are no other records of its distribution in the Islands.

All of the above species except *psectrocera* were described under *Plusia*. Conforming with Hampson's usage in the Catalogue above referred to, they are now all in the genus *Phytometra*. I now add the description of the third endemic species of the genus.

Phytometra violacea n. sp.

♀. Head, thorax and crests on the abdomen greyish brown, many of the scales tipped with violet. Palpi of the same color with a sprinkling of violet. Antennae pale brown. Abdomen grey, with a slight crimson tinge ventrally. Legs greyish brown, with a sprinkling of ochreous. Fore-wings brown, with much suffusion of pale violet, particularly preceding first line, a transverse band following second line, a well-defined patch at tornus and a narrow strip on termen between the latter patch and the apex; in the costal area near base is a small patch of crimson crossed transversely by a sinnuate creamy white line; first line creamy white, from about one-third of costa extending obliquely backward to the cell, obsolete in the cell, dorsal from the cell quite evenly curved to near inner angle, a few crimson scales scattered along both sides of line; second line creamy white, unevenly sinuate, angulated inwardly at the fold, obsolete on the costal area; a creamy white spot on dorsal margin, narrow basally, somewhat bilobed apically and one lobe extending into the cell, in one wing the dorsal lobe is connected with the first of the two oval creamy white spots obliquely placed along dorsal side of vein 2; an oval creamy white spot at end of cell, with a narrow extension towards costa; cilia mostly violet, brown at middle of termen. Hindwings fuscous brown, basal half paler, cilia concolorous. Expanse of wings, 36 mm.

Closely related to *pterylota* but differs in the predominating violet suffusion, whereas *pterylota* has much crimson suffusion; and also in the shape of the second line which is more evenly curved in *pterylota* and does not have the inward angulation at the fold which is present in *violacea*.

Hab. Kokee, Kauai, January, 1919. A single specimen collected at light by Mr. J. A. Kusche. Type in collection of Hawaiian Entomological Society.

NOTES AND EXHIBITIONS.

Plusia pterylota.—Mr. Williams exhibited a specimen of this beautiful rare moth, recently taken by him on the ridge at the southern side of Iao Valley, Maui. The species has been

previously taken on Oahu and Hawaii, but this is the first record for the Island of Maui.

Kilauea Moths.—Mr. Giffard exhibited a collection of moths recently taken by him at light at his place at 29 Miles, Hawaii. Among them were *Plusia giffardi, P. biloba* and the endemic Sphingid, *Celerio wilsoni.* He discussed the very great variation in the numbers of moths coming to light there at various times in the year.

New Nitidulid.—Mr. Timberlake exhibited an apparently unrecorded Nitidulid. The species is undetermined but is apparently an immigrant. It was recently taken by him from a greasy tin on Mt. Haleakala, Maui.

Pseudospectra lobipennis.—Mr. Timberlake exhibited a series of specimens of this peculiar endemic Hemerobiid, taken by him on Mt. Haleakala. It is the only species of one of two endemic genera in which the wings are greatly reduced and are incapable of being used in flight.

First records on Hawaii.—Mr. Swezey reported recently taking the following immigrant species on the Island of Hawaii. It is believed to be the first record of these species on that Island:

Bruchus pruininus at Napoopoo.
Caryoborus gonagra at Napoopoo and Kawaihae.
Heterospilus prosopidis at Honaunau and Kawaihae.

Formicaleo wilsoni.—Mr. Swezey reported seeing an antlion, presumably this species, in the rocky bed of the canyon about a mile north of Kawaihae, Hawaii. The species has not previously been recorded as occurring in West Kohala nor near the coast.

Teratura sp.—Mr. Swezey reported taking at Hilo two females of the same new immigrant Locustid recently recorded by Mr. Pemberton. As far as can be determined from females, it appears to be an undescribed species of the genus *Teratura.*

Nesotocus munroi.—Mr. Swezey exhibited a large series of this large peculiar weevil, taken by him in the Kohala

Mountains of Hawaii, on trees of *Cheirodendron gaudichaudii*. The larvae were abundant, feeding in the inner layers of bark of dying branches of the trees similar to the way the larvae of *N. giffardi* do on the Island of Oahu.

Celerio calida.—Mr. Swezey reported recently breeding a specimen of this endemic Sphingid from a pupa found in a cavity in a dead branch of a *Cheirodendron* tree, the opening to the cavity being closed by a slight web. This was at an elevation of about ten feet from the ground on a tree standing by the Manoa Cliffs Trail on the back side of Tantalus, Oahu. It is thought that the caterpillar fed on some other tree than the *Cheirodendron,* and sought this as a convenient place for pupation.

Aphis-feeding Itonidid.—Mr. Osborn gave further notes on the habits of the aphis-feeding Itonidid recently reported by him. The species proves to be more abundant than had been previously supposed.

Eristalis aeneus.—Mr. Osborn reported seeing this recent immigrant Syrphid at Waianae. Mr. Ehrhorn reported seeing this fly hovering about cellular lava rocks in Manoa Valley. The species is now exceedingly abundant in Honolulu.

Diachus auratus.—Mr. Bryan reported finding this immigrant Chrysomelid at Wailuku, Maui, and exhibited leaves of garden roses which showed the characteristic injuries caused by the feeding of the adult beetle.

Sclerodermus.—Mr. Bridwell gave further notes on the habits of various species of *Sclerodermus.*

Silaon rohweri.—Mr. Bridwell reported breeding the male of this species from the material exhibited last month.

A Dipterous parasite of Corizus hyalinus.—Mr. Bridwell exhibited specimens of a muscoid larva found by Mr. Swezey in specimens of the Lygaeid collected by him from *Euphorbia* on the Ewa Coral Plain near Sisal, which were unfortunately killed before the parasitism was discovered. The larva occu-

pies nearly the whole of the abdomen, the bug apparently being not seriously inconvenienced by this condition.

What the adult fly may be is uncertain, but a small Tachinid fly has been occasionally found in the regions frequented by *Corizus*.

Nesotocus munroi.—Mr. Giffard exhibited a specimen taken by him dead at 29 Miles, Olaa, Hawaii, Sept., 1919.

Kelisia spp.—Mr. Giffard exhibited large series of two species of this Delphacid genus, from the Island of Hawaii, with the following notes: At Kilauea, early in September, he took a large series of both sexes together with nymphs of a species which Mr. Timberlake had discovered early in August on the grass *Deschampsia australis*. The species is believed to be new, and by the edeagus is closely allied to *K. swezeyi* of Oahu.

Of the second species, a good series of both sexes and nymphs was taken by him at Kilauea early in September, on the sedge *Vincentia angustifolia*. This is *K. sporobolicola*, or very closely related to it. It was originally taken at Puako on Hawaii and on Oahu at sea level, but has since been taken on Haleakala, Maui, by Bridwell in 1918, and by Timberlake in 1919. So far the genus *Kelisia* is represented by two species on Hawaii, two on Maui, and five on Oahu, all the species known in the Islands occurring on Oahu except the one mentioned above from Hawaii.

Syagrius fulvitarsis.—Mr. Giffard reported the discovery by Mr. Fullaway and himself of a severe local infestation of the native *Sadleria* ferns at 29 Miles, Olaa, Hawaii, by the Australian fern weevil, and reported on the measures taken to eradicate this local colony. The infestation was apparently confined to about seven acres, and after boundary lines of the area had been laid out instructions were given to cut and burn all *Sadleria* and *Asplenium* stalks and stumps on the area, and appliances were secured to burn over the ground after it had been bared. The Board of Agriculture and Forestry

has undertaken to carry out the work of eradicating this colony. Mr. Giffard considered that the area had not been infested for a greater time than six or seven months.

NOVEMBER 6th, 1919.

The 170th meeting of the Society was held in the usual place, Vice-President Crawford in the chair. Other members present: Messrs. Bridwell, Bryan, Ehrhorn, Pemberton, Potter, Rosa, Swezey, and Timberlake.

In the absence of the Secretary, Mr. Bridwell was appointed Secretary pro tem.

Minutes of previous meeting were read and approved.

A Committee was appointed to prepare an additional list of common names for Hawaiian economic insects. Messrs. Timberlake, Pemberton, and Bridwell.

PAPERS.

Some new Hawaiian Coleoptera.

BY DR. R. C. L. PERKINS, PAIGNTON, ENGLAND.

(Presented by Mr. Swezey.)

This paper deals with a small consignment of beetles belonging to the Longicorns of the tribe Plagithmysini, and to the family Proterhinidae, recently sent to me for determination and description by Messrs. O. H. Swezey and J. C. Bridwell. The type specimens of the new species in this lot will be deposited in the collections of the Hawaiian Entomological Society. In addition to these I have described a few new species of *Proterhinus* of my own collecting which I had occasion to examine in the course of working out the others. The types of these are in my own collection.

The specimens sent had been collected with great care and in nearly every case the trees or plants on which they were found had been carefully noted. This is of great importance

in the case of the Longicorns, but even more so in that of the excessively difficult genus *Proterhinus,* for without such data one may well despair of arriving at any definite conclusion as to the validity of many of the species, the variation often being excessive and the distinguishing characters very slight and difficult to appreciate. At present I am myself left with a collection from all the Islands of hundreds or thousands of undetermined or dubious, though well-mounted, specimens. If it were possible for me to receive other such consignments, carefully collected with data, I should hope to be able after a time to revise the whole genus, and possibly to make some such tabulation of the species as would facilitate their identification. As might have been expected, some of the species formerly described by me are now known not to be distinct, while others once thought to be confined to one Island, I have subsequently taken on others. Some of the earlier species contained more than one form under the same name. In my collection these mistakes have been mostly rectified, but I have not had the opportunity of making the same corrections in the other collections. In this paper, I have not dealt with such matters to any considerable extent, as it has been advisable to complete the descriptions of new species and return the specimens as quickly as possible, because all my collections have to be packed up for an almost immediate removal to a new address.

I would urge those, who are fortunate enough to have the opportunity of collecting further specimens, to aim at getting together a smaller collection of specimens with accurate notes as to food plants and other data, rather than a much larger one collected at random, though the former method occupies much more time. I feel sure that it is only from careful collecting of specimens that really definite results are to be expected. In examples collected at random one can always pick out certain species, as obviously distinct, but a large amount of the material will remain dubious or undetermined. At most one can say that specimens without careful notes as

to food-plant, etc., are better than nothing. Casually collected examples in indifferent condition are almost valueless.

Cerambycidae, Plagithmysini.

Nesithmysus gen. nov.

This name is proposed for a large species of the Plagithmysini, with a much wider prothorax than that of *Plagithmysus*, this part being hardly less wide in the middle than the base of the elytra. The latter are long, less pointed or cuneate than in *Plagithmysus*, and the wings in repose are shorter, so that the tips which are bent inwards, can be almost, if not quite, covered by the elytra. Owing to the length and form of the wing-cases, the insect has a heavy and less elegant facies than that of the other genus. The pronotum has a median crest well elevated in front and behind, the ridges on either side of this are represented by black callus lines elevated into strong tubercles posteriorly. The second and following joints of the antennae have only very sparse fine hairs. The hind femora have a well-marked apical club, very similar to that of some species of *Clytarlus*. The hind tibiae and tarsi are only thinly clothed with hair and differ greatly in this respect from normal *Plagithmysus*. The elytra have no definite pattern of markings, being clothed with extremely minute pubescence, but at the extreme base between the scutellum and the shoulders there is an indefinite area clothed with longer and denser yellow hair.

Obs. I do not think it possible to retain this insect in either of the two genera referred to above, but it is more nearly allied to *Clytarlus* than to the other. Dr. Sharp has already pointed out that certain species described by him, having intermediate characters, are placed with difficulty. At present, I find it convenient to assign to *Plagithmysus* all those species which closely agree in the dense clothing of the hind tibiae and tarsi, although this causes some changes in the arrangement adopted in the "Fauna Hawaiiensis". This plan will throw into *Clytarlus* some species now included under *Plagithmysus*, but which in general facies seem to agree better with the former. I have alluded to this matter because one of these troublesome forms is described below.

Nesithmysus bridwelli n. sp.

Ferruginous or rufescent; the head black, thorax beneath largely black or dark. A stripe on the median crest of the pronotum (varying in

width), one on each side of this, not reaching either the front or hind margins, and ending in a bifid dilatation at the posterior tubercles, a small spot on each side at about the middle of the length of the pronotum, black. More or less of the scutellum, the extreme tips of the femora and the apices of the hind tibiae (at least beneath) are also dark. Face beneath the antennae with yellow hair, an indefinite pubescent patch of this color at the base of each wing-case and a spot at either extremity of the mesopleura; breast with pale flavescent pubescence. Sides of abdomen with minute appressed pubescence and closely punctured, the general surface between these shining, sparsely punctured and clothed with erect, fine hairs. Fifth ventral segment excised at the apex in the middle.

The pronotal crest is much more pointed in front in one example than in the other, but such variation is common in *Plagithmysus*. The individuals examined have the appearance of being females, but the sex is not certain without dissection. Length, 22-24 mm.

HAB. Oahu, Mt. Kaala; one on ohia lehua July 4, 1916 (O. H. Swezey); one on July 22, 1917, on *Broussaisia* (J. C. Bridwell). Described from these two examples.

Plagithmysus swezeyi n. sp.

Head, pronotum and breast red, elytra black. Legs black or nearly so, but the femora are red on the basal portion, more yellow in the case of the hind pair, where the pale portion occupies about half their length. Antennae dark brown or blackish fuscous. Hairs of the hind tibiae and tarsi dark. Face with minute white hairs (perhaps abraded), labrum and the adjoining part above with yellow setae. Pronotum with a narrow snow-white band on either side of the median crest, the bands not dense, and a trace of a small white spot on the middle of the densely punctate sides. Elytra shining, roughly punctured on the basal portion and with small spots (not closely placed) of snow-white hairs; on the posterior half the spots are placed in a line on either side of the suture and become minute towards the apex; the spots are mostly much separated from one another. Mesopleura with a dense white spot in front and behind. Hairs of the hind tibiae and tarsi dark. Length, male, 15 mm., with the exposed tips of wings.

This very elegant species belongs to the *vitticollis* group, and should be placed next to *P. longulus* (which will probably prove distinct from *P. vitticollis*). It is readily distinguished by the red head and pronotum and the two narrow snow-white pronotal vittae. The female will very likely have a smooth impunctate area on the sides of the pronotum.

HAB. Hawaii, Niulii. A single male, captured May 19, 1917, by Mr. Swezey, is the only example I have seen.

Plagithmysus platydesmae n. sp.

Head and usually the thorax black, but the latter may be pitchy or reddish down the middle. Elytra brown or yellowish brown at the sides and usually on the basal portion in front of the median black-pubescent area. On the middle portion from the base of the furcate lines to the tips they are darker, generally nearly black or dark brown. In one example the dark part occupies all the middle right up to the base, only the humeral section of the base being brown. Antennae dark, the scape more or less red, and the following joints sometimes also red-tinged. Femora red, black at the apex.

Face densely clothed with yellow hair, the pronotal vittae dense, yellow, usually broad, the lateral ones occupying the whole deflexed sides, except that they enclose or are deeply divided by a glabrous strip. Elytra with a deep black tomentose spot across the suture towards the base (as in the other members of the *bishopi* group), in front of this with by no means dense, yellow hairs, and more or less roughly punctured; the longitudinal lines furcate, of dense yellow hairs and with a feeble line of the same color produced backwards from the tip of the furcation on each side. On the apical portion of the elytra the punctures become obsolete or subobsolete. Mesopleura with a continuous, or almost continuous, band of dense yellow hair, and the abdominal segments with a dense band of the same color, broken into spots if the segments themselves are greatly distended. Hind tarsi with dense white hairs. Breast beneath with a yellow band reaching from the front to behind the middle coxae. Length, 13-18 mm.

One example, which is certainly a female, has the glabrous area enclosed in the band on the side of the pronotum highly polished to a large extent; but another, which, from the appearance of the abdomen, is also of that sex, has it dull, and densely punctured, as in the male.

Most like *P. collaris* of Maui, but with totally different pronotal ornamentation, and with the apical portion of the elytra much less definitely punctured.

Hab. Hawaii, Glenwood (March 2, 1919, Swezey). Seven examples bred from affected wood of *Platydesma campanulata* brought down from this locality to Honolulu. The description is drawn up from these examples. All the other members of the *bishopi* group are known to be attached to *Pelea*, which is placed next to *Platydesma* in Hillebrand's "Flora". *P. bishopi* was bred by me from *Zanthoxylum* (also an allied tree) as well as from *Pelea*.

Plagithmysus elegans Sharp.

I possess the female of this species. It does not seem to

differ in any important manner from the male described by Sharp.

Plagithmysus giffardi Perkins.

I think it possible that there were two species contained in the eight examples on which *P. sulphurescens* was originally described. Most of the examples taken were found on *Urera*, in which tree it was breeding; some had to be kept alive in order to become mature. Two or three specimens, however, were captured on the wing in a slightly different locality and it is possible that these were the same as the form I subsequently described as *P. giffardi*. Both in the diagnosis and in the English description, Dr. Sharp refers to the "rufescent" or "fulvotestaceous" area at the base of the elytra, and this accords with my recollection of the specimens obtained on *Urera*. The figure in the "Fauna Hawaiiensis" does not show these markings and may have been made from one of the examples taken on the wing and likely to be *giffardi*. In the remarks on variation, Dr. Sharp refers to a reduction of the black color, but not to its extension in any of the specimens. Although I have in the past had many specimens of *giffardi*, and still have a score left, I have seen none with the elytral markings of *sulphurescens*. All the former were from *Myrsine* (now known as *Suttonia*).

Clytarlus indecens n. sp.

Head and pronotum dull red, sometimes nearly entirely suffused with black, the femora not much different from these in color, generally of a browner tint; hind tibiae more yellow, paler than the femora, distinctly dark on about the apical third or fourth. Antennae for the most part testaceous, and nearly concolorous with the elytra. The general appearance is that of *C. modestus* Sharp, but under a moderate lense the pronotum and elytra appear glabrous, while under a compound microscope it is seen that a short seta springs from each of the elytral punctures. There is no pattern of any sort formed by pubescence and the elytra are densely, somewhat strongly, rugulosely punctured, the sculpture distinct even at the sides and on the apical portions. Two slightly raised parallel lines extend from the base to beyond the middle of the wing-cases, and another pair outwardly and parallel to these from the neigh-

borhood of the shoulders. The hind femora are thin at the base and then gradually dilated to near the apex, quite unlike normal *Clytarlus* and in fact much more like true *Plagithmysus*. They are less like those of the former genus than are those of the abnormal *P. immundus* Sharp (F. H. III, 646). The hind tibiae and tarsi are very inconspicuously hairy (see remarks above under genus *Nesithmysus*). Length, 7-10 mm.

Obs. All the typical *Clytarlus*, as at present known, are attached either to *Acacia koa* or to *Sophora chrysophylla* and although many *Plagithmysus* feed on these, others affect most varied plants. Those species of *Clytarlus* which are not attached to the Acacias are abnormal in structure and will probably be separated generically from either genus in the future.

Hab. Oahu, Mt. Kaala; one example (the type) collected by H. T. Osborn, Sept. 7, 1913; three examples bred from dead stems of *Smilax* (July 9, 1916, Swezey). The description is mainly drawn up from the type and best preserved specimen. The other three examples all appear to have died before becoming properly mature and are not in good condition, though easily identifiable.

Proterhinidae.

Proterhinus swezeyi n. sp.

A large species with the surface of the pronotum and elytra very uneven and the erect setae very long, numerous, and conspicuous. Reddish fuscous, some parts (e.g. the humeral parts of the elytra) being more red, others more obscure in color. Legs and antennae red, the former of paler color than the latter.

Rostrum of the female short, hardly longer than its greatest width, eyes well-developed and extremely prominent, not differing much from those of some examples of *P. deinops*, but the head has not the strong transverse constriction of the latter. The rostrum is not polished in the middle, but minutely sculptured there, and the grooved lines on each side of this owing to the sculpture towards the sides being longitudinally rugose do not stand out distinctly. Antennae slender and of good length; the scape elongate triangular, and stout; the club slender, 3-jointed, its basal joint elongate and by no means wide, but being much wider at the apex than the preceding joints, the club as a whole is well-marked. Pronotum strongly and suddenly narrowed anteriorly, the constricted part longer than in most species, with a large round fovea or impression on each side behind the constriction, the part between the foveae sub-

impressed, so that two more or less evident ridges are formed between this impression and the lateral foveae in some aspects. Elytra with the humeral angles produced or subacute, and with a distinct, densely setose tubercle on either side of the scutellum, the space between these tubercles and the humeral angles strongly impressed. The mid-dorsal portion of the elytra, for about two-thirds of their length, is flattened, but uneven, bare and depressed areas occurring amidst the squamosely clothed surface. The flattened area forms at its junction with the decurved sides a pair of uneven lonigtudinal ridges, each terminating posteriorly as a raised tubercle, owing to the apical portion of the elytra being of simple convex form. The squamous covering of the pronotum and elytra is of a greyish golden color and is dense, but unevenly distributed, so as to form maculations on the elytra. The erect setae are very long and spiniform, as also are those on the legs. The lobes of the tarsi are of moderate size. The punctures of the basal abdominal segment beneath remain coarse and distinct on the middle part. Length, female, 5 mm.

HAB. Oahu, Mt. Olympus (near Honolulu), Sept., 1917. A single female of this interesting and beautiful species was obtained by Mr. Swezey from the native palm, *Pritchardia martii*, an uncommon tree on Oahu. In some respects it appears to be a connecting link between the *blackburni* group and the other members of the genus.

Proterhinus euops n. sp.

Head and thorax of a sordid red, or reddish black, quite red if somewhat immature; the elytra red and black, as a rule extensively dark with the sides, base and apex more red, and the dark area containing red spots. The antennae are somber red and the legs much paler than these or ferruginous.

Pronotum with almost even clothing of golden squamosity, which is not very dense, but with a small distinct dense spot, often nearly white at the hind angles. The elytra are maculate, the pale parts bearing golden and whitish squamosity or appressed setae, the dark areas being bare, while the erect white setae are of moderate length, numerous, and very conspicuous on the posterior parts.

Head with large, outstanding, subconical eyes; strongly constricted behind these, so that an evident transverse ridge is formed. Antennae rather long, with slender three-jointed club, the ninth joint being considerably wider at the apex than the eighth. Rostrum of female shining, the punctate grooves distinct. Pronotum and elytra formed exactly as in some large examples of *P. gracilis* Sh., the former constricted in front and there impressed in the middle, the two impressions or foveae behind this very distinct. Elytra long and narrow, nearly parallel-sided until they become rounded off to the apex, the humeral angles acutely

produced, the tubercles near the scutellum covered with dense appressed pale setae and very conspicuous. The punctures are close, coarse and distinct. The basal abdominal segment beneath has the punctures distinct on the middle portion, but they are not close nor coarse on that part. Length, 2.75-3.5 mm.

HAB. Oahu, Mt. Kaala (July 9, 1916, O. H. Swezey). Twelve examples, one or two being immature and newly emerged, on *Euphorbia.*

Proterhinus euphorbiae n. sp.

A red species, the thorax and head often more sordid, the elytra with dark (black or fuscous) spots. The club joints, or at least the two basal ones, usually appear dark compared with the preceding joints of the antennae. The clothing of the insect consists of golden squamosity (fading, no doubt, to whitish) while the elytra bear also conspicuous white erect setae, which are quite numerous on the apical portion.

Head without a raised transverse ridge or constriction behind the eyes, which are only of moderate size. The antennae are very slender (more so than in the preceding) with distinctly 3-jointed club. The rostrum of the female is very smooth and shining, with the punctate grooved lines extremely fine, though more developed in one example than in the others. Pronotum not at all wide, the three impressions distinct, but varying to some extent, the hind angles are rendered distinct by a condensation of the squamous covering, so as to form a pale spot at that point in dorsal aspect. Elytra long, arcuately emarginate at the base, so that the humeral angles are acutely produced, the golden squamosity absent from the dark spots or markings, which are chiefly placed about the middle or on this and the hind part of the surface. The basal abdominal segment is coarsely punctured even on its middle portion. Length, female, 2.5-3 mm.

This species is I think evidently allied to *P. robustus* and the variable *P. heterostictus,* which are both found in the same neighborhood, though the former (as well as the latter) is now known to me to occur also in the Koolau Range. *P. robustus* is distinguished at once by its antennal characters. *P. heterostictus* differs from the species now described in its less narrow and elongate elytra, different pronotal structure, etc. *P. euphorbiae,* though found with *P. cuops,* is not at all closely allied to it, the elytra are only obsoletely tuberculate on each side of the scutellum, or at least the tubercles are not rendered prominent by a special clothing as in the other, and the punctures are much less gross.

HAB. Oahu, Mt. Kaala (July 9, 1916), three females; the same but on the west side (June 1, 1919), two females

evidently older. All were taken from *Euphorbia* and the male was not procured (O. H. Swezey).

Proterhinus impressiscutis n. sp.

A red or ferruginous species with a dark elongate marking on each side of the elytra near the middle of their length. The appressed clothing is golden in fresh examples at least, the head and pronotum being densely clothed. On the elytra a not very distinct stripe, appearing slightly paler, extends from each humeral angle, these stripes being convergent; erect white setae are quite evident along the side margins and on the posterior part of the wing-cases, but they are sparse and short.

Rostrum of the female polished and elongate, about twice as long as wide, and with the impressed punctate lines very distinct and well-marked. Antennae entirely red, slender, with 3-joined club. Eyes small. Pronotum as wide or wider in the middle than the width of elytra at their base, and with the anterior foveae not deep, less evident in a well-clothed example than in a partially denuded one, and rounded at the sides, with little or no appearance of a constriction anteriorly; the posterior foveae are obsolete or indistinct. Elytra subcuneate, the humeral angles distinct, owing to the obliquity of the basal margin of each wing-case, the scutellar region occupied by a deep fovea. Punctures in some aspects very distinct and definite, and not dense. Basal abdominal segment beneath shining, distinctly, but not closely, punctured in the middle, the sternum coarsely punctured. Length, female, *vix* 3 mm.

Hab. Oahu, Mt. Kaala (July 4, 1916); described mainly from a single female captured by Mr. O. H. Swezey on *Euphorbia*. I have once or twice captured single examples that appear to be this species, in the same locality, but without note of food-plant. These specimens are covered with exudation, which I have at present been unable to clean off satisfactorily.

Proterhinus bridwelli n. sp.

A red species, the head and pronotum more sordid or rufofuscous, rostral portion of head black. In some aspects and lights the antennae are entirely red, in others they appear largely dark (male). The elytra have a vague dark marking near or behind the middle on each side. The clothing is golden, the elytra bearing some white spots chiefly on the apical portion and there are a very few short white erect setae on them posteriorly. Eyes prominent, but not large. Antennae with very short globose second joint, the club very definitely 3-jointed, its basal joint being very large compared with the preceding and its apex seen at the widest is hardly less so than that of the following joint. The joints preceding the club are short and submoniliform. Pronotum only

slightly impressed in front and without any strong constriction, the foveae hardly visible, the clothing denser along the sides. Elytra at the base as wide as the pronotum, the humeral angles not sharp, but fairly distinct, the punctures on the basal portion dense, distinct in some aspects and tending to run into one another. There is hardly any impression between the scutellum and the humeral angles, the elytra being of simple form and short, about one and a third times the length of the pronotum. The basal abdominal segment beneath has the punctures on the middle portion very feeble or obsolete. Length, male, 2.5 mm.

HAB. Maui, Iao Valley, Sept., 1918, on *Euphorbia hookeri integrifolia* (J. C. Bridwell). Described from a single male. When I first examined this species it reminded me of the very differently colored (black) *P. breviformis* of Lanai, but on comparing the two, I find the differences of structure (antennal joints, pronotum, etc.) so great that they do not appear to be closely allied.

Proterhinus asteliae n. sp.

A red species, with the antennae entirely red, the head and pronotum with golden squamosity (fading to white); the clothing of the elytra broken up into lines or spots, being variable in extent, so that they are prettily maculate, the bare parts being often black or dark, but sometimes red. Remarkable amongst the species with simple humeral angles to the elytra for the great length of these. The color and maculations resemble those of *P. pteridis*, but that is a still narrower insect, with totally different antennae.

Antennae of moderate length, about three-fourths the length of the elytra, appearing rather short from the elongation of the insect. Second joint as long or longer than the fourth and much more robust, basal joint of the club much less wide at the apex than the second, but notably longer and wider than the last funicle joint. Rostrum of the female very polished, and the punctate lines very feeble. Pronotum somewhat narrow, usually appearing considerably less wide than the widest part of the elytra, the posterior impressions not deep and sometimes obsolete. Elytra twice or even more than twice the length of the pronotum, and about twice as long as their width at the base; they have coarse, deep punctures, generally appearing to form rows on a large part at least of the surface. The erect setae are short and sparse, white, and in dorsal aspect will be noticed on each side of the suture towards the apex. Basal abdominal segment with the punctures feeble or obsolete. Length, male and female, 2.5-3 mm.

HAB. Oahu, Mt. Kaala (July 4, 1916); fourteen exam-

ples (O. H. Swezey). Mr. Swezey informs me that the larvae are miners in the lower part of the leaves of *Astelia veratroides*.

Proterhinus abnormis n. sp.

Red, the elytra with black markings, sometimes almost wholly black. Head rarely black. Antennae red, the club sometimes black. The appressed clothing is of a golden color. The female head is like that of a male, there being no development of the beak such as is usual in the former sex of the genus. Beak short, transverse or at most almost square in outline, the eyes strongly convex, but not large; the antennae with the second joint longer and much stouter than the fourth, second joint of club much wider than the first and in some aspects the club appears almost as only 2-jointed, though its first joint (i.e. the 9th antennal joint) is really both longer and evidently wider than the 8th.

Pronotum with three depressions, the hind ones sometimes feeble (liable to be concealed by excretions), its sides rounded, but the curves are suddenly interrupted in front, so that the anterior constriction is great or considerable; the golden clothing is fairly evenly distributed, but the bottom of the anterior fovea is often bare. Elytra usually with a conspicuous black or dark area on each side about the middle, but in one specimen the black is much more extensive, leaving only the basal margin and some spots on the apical third pale. They are prettily variegated in pattern, owing, in general, to the absence of the golden clothing from the darker parts. The short pale erect setae are very sparse and not conspicuous, chiefly noticeable at the sides and on the apical portion. The surface of the elytra is more or less uneven, some parts being slightly raised. This is especially noticeable on the pale spots which form a transverse (often broken) band on the posterior third, these being evidently raised. There is often a vague oblique ridge behind the shoulders and traces of other inequalities of surface. The humeral angles are distinct and generally subacute or subrectangular, the elytral punctures coarse.

It may be noted that there is usually a fine median longitudinal carina on the rostrum, but it is sometimes only visible in certain aspects and sometimes, perhaps, wanting. Length, male and female, 1.75-2.25 mm.

Hab. Oahu, Mt. Kaala (Sept. 7, 1913, and July 9, 1916); on *Broussaisia*, the larvae are miners in the leaves (O. H. Swezey). Described from 11 examples.

Proterhinus phyllobius n. sp.

This species is allied to the preceding, the female having only a short beak like that of the male, and lacking the usual characteristics of this organ as exhibited by the females of all other species. The color is very variable between entirely black and entirely red, except for a dark area

on each side of the elytra. The legs and antennae are always red, though 2 or 3 of the apical joints of the latter are sometimes somewhat infuscated.

It differs from the preceding in the elytra being narrower, without the uneven surface described above, in their different clothing which is much less developed, so that these generally appear nearly bare and shining except for minute setae, and the pronotum also is much less closely covered. This species would be difficult to distinguish from worn examples of various other more obscure members of the genus, were it not for the similarity of the rostrum in both sexes, so that while it never resembles the female of any other species, it differs from most males by the greater length or more definite character of this organ. Length, male and female, 1.6-2 mm.

This species is mainly described from a series of 13 examples given me by Mr. Swezey some years ago, which were cleaned and mounted by me when newly captured. Others taken with these were dissected at the same time. In addition to these, I have used well-mounted examples taken casually at an earlier date without note of food-plant, these having remained unnamed, as being doubtfully distinct from some described species. I have more superficially examined a series of 30 examples mounted on points and collected by Mr. J. C. Bridwell.

Hab. Oahu, in the mountains near Honolulu. This species was found by Mr. Swezey to have the abnormal habit of mining the leaves of *Broussaisia*. Mr. Bridwell's examples were collected on Kaumuahona, July 23, 1916.

Proterhinus fuscicolor n. sp.

A dark pitchy brown or pitchy black species, the pronotum generally, the head often and sometimes the base of the elytra with an obscure red tint. An elongate species of the group of *ferrugineus epitretus* and *detritus*, but very distinct by its sordid color.

Antennae appearing rather short compared with the length of the whole insect, between two-thirds and three-fourths the length of the elytra, red, the club joints often appearing more or less dark. Rostrum of the male shorter along the sides than the width, of the female elongate, not polished but rugulose, so that the punctate grooved lines are obscured, or more or less effaced. Pronotum narrow compared with the elytra, conspicuously and definitely narrowed in front, the golden clothing not dense, so that the rough sculpture is easily seen, the sides

with outstanding curved setae quite conspicuous; the posterior foveae or impressions sometimes indistinct, sometimes entirely wanting.

Elytra long, sparsely clothed, so that the coarse close punctures are easily seen, the clothing consisting of very minute setae, and of longer erect pallid ones, these also being short. Humeral angles distinct and produced, the tubercles at the base, on each side of the scutellar region, are very little developed, but their position is rendered evident by a condensation of clothing on their surface, forming a pair of small but noticeable spots, distinct from the general vestiture. The femora, and tibiae may be either red or dark. The basal abdominal segment is distinctly punctate on the disc, microscopically sculptured between the punctures. Length, male and female, 2.5-3.5 mm.

HAB. Maui, Haleakala (August 29, 1918, Swezey); described from 26 of the 27 examples captured on the dead leaves at the bases of the rare and very local Composite plant, *Argyroxiphium virescens,* growing in a small canyon a little above Puu Nianiau.

Proterhinus cuneatus n. sp.

Head and thorax obscure red, with golden clothing, the elytra red with the covering whitish, this being nearly uniform except on the black spots, which are bare and situated mostly near the middle of the wing-cases. The elytra are widest at the base, the sides almost straightly converging from the shoulders.

Most like *P. molokaiensis,* probably an even rather larger species, with long antennae, but at the same time the elongate funicle joints are much stouter than is usual in the genus and rather resemble those of the species just named.

Eyes large and very convex, the head strongly constricted behind them, so that a strong ridge is formed there, though less evident in the middle. Scape of antennae long and robustly subtriangular, the second joint elongate, as long as the fourth and much stouter, all the funicle joints elongate, the seventh antennal joint being twice as long as its apical width and the eighth very much longer than wide. The rounded sides of the pronotum are set with quite conspicuous curved setae and very greatly narrowed anteriorly; the anterior impression is very large and though deep is vague, the posterior pair are roundish, very deep and distinct. Humeral angles of the elytra very strongly produced, the tubercles on either side of the scutellum also produced, but less strongly, and bearing a spot formed by whitish setae; the punctures are deep but not at all dense on the basal portion of the elytra. The erect setae are white, long and slender, very conspicuous, being more numerous than usual. Femora dark, the tibiae red, tarsal lobes not large for the size of the insect. Length, male, 4.5 mm.

HAB. Maui, Haleakala, about 4000 feet. I have seen only one example, the type, in my own collection. It was collected many years ago and is in beautiful condition. Apart from the structure of the head and important differences in the antennae, the specimen greatly resembles some examples of my series of *P. molokaiensis.*

Proterhinus malespretus n. sp.

Black or blackish fuscous, a small basal and apical portion of the elytra seem to be red, when closely examined, but the color variation is unknown, as the specimen (male) is unique; the squamous covering is golden. Antennae red, the more apical joints appearing black or almost so.

Eyes fairly large, but not at all strongly convex or prominent as compared with many species, the head not constricted so as to form a transverse ridge. Antennae in no way remarkable, the funicle joints are more or less elongate, the apical ones not at all moniliform; the fifth antennal joint notably longer than the sixth. Pronotum nearly round in outline, with the three impressions distinct, the clothing nearly evenly distributed, but with a small whiter patch just in front of each of the posterior foveae. Elytra arcuately emarginate at the base, so that the humeral angles are very distinct or subacute; at the base in the middle (as is easily seen in lateral aspect) they rise up in a strongly convex or oblique manner for a short distance, when the suture becomes slightly raised or prominent. The golden squamosity is distributed over most of the surface and the white elongate, erect setae, though not very numerous, are extremely conspicuous; the punctures on the median portion are not close. The form of the elytra is somewhat short, the base being wide. Length, male, 2.25 mm.

This species appears to me to be quite distinct. Superficially it resembles some examples of *P. squamicollis* as nearly as any Oahuan species, but it may be more closely allied to the *vestitus, robustus* group.

HAB. Oahu, Waianae Mts.; a single male (the type) was collected by me in the winter months (probably January) of 1903 and has been set aside as new in my collection for many years.

Proterhinus longisetis n. sp.

Only a single female of this species has been examined. The head is black, the pronotum obscurely red, being very much suffused with

black, the elytra except for dark spots, the tibiae and more than the basal half of the antennae distinctly red. Squamosity of head and pronotum golden, the latter with large and dense lateral patches of whiter color. Elytra partly abraded, apparently with golden clothing, but with a broadish white stripe extending back from each shoulder to the apex, and with the white erect setae very slender, long and conspicuous on the posterior part. The setae of the hind tibiae are also slender and elongate, but not so long as the longest of those on the elytra. Rostrum shining, with the punctate lines very fine, the head simple without transverse constriction behind the eyes. Antennae rather long, slender, funicle joints all more or less elongate, not at all moniliform. Pronotum strongly rounded at the sides, much narrowed in front and deeply impressed there, the posterior impressions wanting or at least very feeble. No erect fine setae on the pronotum such as are seen in *P. leptothrix*. Elytra almost simply convex, very slightly emarginate at the base, but with distinct humeral angles, which are practically rectangles, the sides are slightly rounded so as to be a little wider about the middle than at the base, but even at the widest part they hardly exceed the pronotum (at its middle) in width. Length, female, *vix* 3 mm.

Hab. Oahu; a single female taken by me in the part of the Koolau Range that is connected with the Waianae Mts. by an elevated plateau. The fine elytral setae remind one of *P. leptothrix*, but that species cannot be at all closely allied.

Proterhinus ater n. sp.

A black or almost black species, with long dark, almost unicolorous antennae, the scape large and unusually long in the male, almost like that of the female. Clothing golden, the elytra largely bare and black, the squamosity forming maculations. Belongs to the species with simple humeral angles and is allied to the variable *P. similis*.

Eyes not at all large, rostrum of female polished and with the grooves distinct. Scape thick and long, rather stouter in the male, but about equal in length to that of the female; second joint longer than wide and stouter than the following ones, which are all elongate, the antennae after the two basal joints, have an unusually slender appearance. The length of one of them in the male is just about equal to that of the elytra. The anterior impression of the pronotum is always present, but the posterior pair are very faint or not noticeable at all in dorsal aspect. The squamosity forms a dense patch on each side of the pronotum. Lobate joint of the front tarsi distinctly small. Elytra of quite simple form, often noticeably flattened or subdepressed on the dorsum, the pale erect setae very conspicuous on the posterior part and in quite unabraded examples with a regular row of almost similar ones

along the whole sides. Front and hind femore extremely stout. Length, male and female, 2.5-3 mm.

This species comes rather close to some extreme forms of the Kau examples of *P. similis,* and I am not sure that in the past I have not actually taken it, or a very closely allied form, in that district, but probably these were referred by me to *similis.* At the present moment I am only able to put my hand on one specimen of this extreme form that approaches *ater,* and it is easily distinguished by the shorter scape (male). Its color is red to a large extent, but probably it would vary to black, so that no importance can be attached to this.

Hab. Kona, Hawaii, 3000 feet. I have in my collection half a dozen very good specimens of this species and one of the males is taken as the type.

The following species sent in this consignment are, in my opinion, the same as ones previously described by me:

Proterhinus vestitus Sharp.

Five examples of this polyphagous species from *Ipomoea bona-nox,* taken by Mr. J. C. Bridwell. It breeds in *Aleurites, Pisonia, Charpentiera, Pipturus, Dracaena,* etc. One batch of specimens which I bred from *Pipturus,* though fully mature, remained entirely red with no black markings, but usually the examples from *Pipturus* are quite like those from other trees or plants.

Proterhinus subangularis Perkins.

Twelve examples of this common and widely distributed species were taken at Punaluu, Oahu, by Mr. Bridwell on *Straussia.* It is very doubtful whether *subangularis* and *obscuricolor* are distinct species, or even worthy of varietal names; *angularis* and *deplanatus,* at any rate in the typical form, seem more distinct, but their specific value is dubious. All are attached to *Straussia,* almost if not quite exclusively. Some colonies of each of these forms are fairly constant, others yield very aberrant examples amongst the normal ones.

Proterhinus antiquus Perkins.

A single example taken by Mr. Swezey on Mt. Kaala in company with *P. abnormis,* described above. It is in poor condition, but I have several from Kaala that are much better in this respect, one being very fresh. I cannot separate these from some specimens of the Kauai *antiquus.* The individuals captured by me were taken casually, but certainly not on *Broussaisia.* There is also a closely allied and apparently new species in the Koolau Range, but I should like to see more examples than those I have collected.

Proterhinus deceptor Perkins.

Two small and fresh examples; one taken by Mr. Bridwell on the coral plain at Ewa from *Euphorbia,* and one taken by Mr. Timberlake on Diamond Head from *Lipochaeta,* agree excellently with minute examples of a large series bred by myself from *Gossypium.* In the latter series were examples twice or thrice the size of the smallest ones. Other series have been obtained from the hau and various other trees.

Fourteen examples from Kilauea, Hawaii, found by Mr. Swezey on the rare tree *Hibiscadelphus Giffardianus* belong to the form var. *major* (hardly to be separated from var. *konanus*). They differ much in size and somewhat in other respects from the minute examples mentioned above, but with series from different islands and taken from different plants I am unable to split up the species.

Proterhinus excrucians Perkins.

An example of the smaller, narrower variety of this most difficult and variable species is in poor condition. It was captured on the lowlands (on the Ewa coral plain), on *Sida* by Mr. Bridwell, and differs in no wise from some of the depauperated examples taken in the mountain forest above Honolulu.

Proterhinus obscurus Sharp.

A male of the darkest variety of this variable species was

captured by Mr. Swezey on *Pritchardia*, Mt. Olympus, Oahu. It is well known to be polyphagous. Several other specimens were taken by him from *Euphorbia* in Manoa Valley. These are of the paler form, and hardly differ from slightly faded examples of var. *chryseis*. One of the males is much larger than the other. I have great doubt whether *P. minimus* is more than a depauperated form of this same species.

NOTES AND EXHIBITIONS.

Clerid beetle.—Mr. Pemberton exhibited specimens of a species of Cleridae taken by him on dead wood of Monkey-pod tree (*Samanea saman*) brought to the Experiment Station, H. S. P. A., from their forestry nursery near Vineyard Street and Nuuanu. The species is apparently a previously unrecorded immigrant.

Bostrychid beetle.—Mr. Bridwell exhibited specimens of an undetermined Bostrychid taken from a packing case in which cigars had been imported from Manila. The species does not seem to have become established. Mr. Ehrhorn recalled taking a beetle under similar conditions, and examination of specimens showed this to be the same species. The box was made of a native Philippine wood which Mr. J. F. Rock considered as probably a species of tropical cedar. A general discussion of the introduction of insects in commerce other than those articles subject to plant quarantine inspection followed.

Celerio sp.*—Mr. Bryan exhibited a specimen of an undescribed endemic species of the Sphingid genus *Celerio* taken by him on the ascent from Manoa Valley to Pauoa Flats, Oahu, October 5th, 1919. The only specimens of this species heretofore known are a very much rubbed specimen taken by Mr. Swezey at Palolo Crater, September 3rd, 1906, and another very much deformed specimen bred by Mr. Swezey

*Described on page 379 as *Celerio perkinsi*. (Ed.)

from a caterpillar on *Straussia* from Mt. Tantalus, Oahu, January 16th, 1916.

Eristalis aeneus.—Mr. Bryan gave notes on the bibliography of this fly, and a general discussion of its extreme abundance followed. This muck-breeding fly is now conspicuous by its entrance into houses, particularly in the lower Manoa, Punahou and Kalihi districts of Honolulu, and is also found abundant on the Ewa Coral Plain. None of the members had found its breeding places and none could suggest any type of breeding place which would account for its general abundance. Mr. Timberlake suggested that on account of its strong powers of flight it might be distributing itself from some centralized breeding places. Mr. Bridwell suggested that from the known breeding places of its allies, *Volucella obesa* and *Eristalis punctulatus,* it is probably breeding in the pineapple refuse at the canneries in Iwilei and in the sisal refuse at the sisal mill.

Xyleborus spp.—Mr. Bridwell exhibited series of both sexes of three species of Scolytidae belonging to or related to *Xyleborus.* These are all ambrosia beetles, the burrowing being done by the adult beetles while the larvae feed upon a fungous growth in the tunnels. One of the species exhibited was from the wiliwili tree (*Erythrina monosperma*) on the Ewa Coral Plain; another was taken from the branches of *Dracaena aurea* in Nuuanu; and the third was working in ohia ha (*Syzygium sandwicense*). Other species are known to attack *Acacia koa, Bobea, Straussia, Perrottetia,* and other native trees, and it is probable that when the group is thoroly collected that many species will be added to the few which have been described.

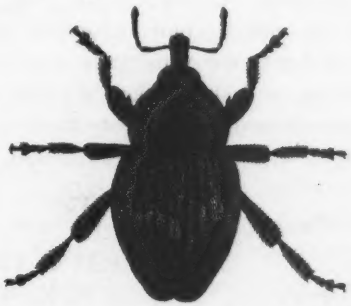
Odynerus pseudochromus.—Mr. Bridwell exhibited specimens of what he considered an undescribed variety of this species of wasp, recently bred by him from Nuuanu Valley. The female has round red spots on the second tergite and

irregular ones on the angles of the propodeum, while the male has the clypeus encircled with a reddish yellow margin.

Plagithmysine in Syzygium sandwicense.—Mr. Bridwell exhibited living larvae of a Plagithmysine Cerambycid found working in the dead bark of *Syzygium sandwicense* above the eastern waterfall at the head of Manoa Valley, and reported finding larvae of the same group in the living bark of *Bobea* and *Pittosporum*. *Callithmysus hirtipes* which has recently been bred by Mr. Swezey from *Perrottetia* has been recorded as breeding in *Bobea*, while the other species of trees mentioned have no species of Plagithmysini recorded as attached to them on the Island of Oahu.

Sclerodermus spp.—Mr. Bridwell gave further notes on the habits and variations of some species of *Sclerodermus*.

New Immigrant Chrysopid.—Mr. Timberlake reported the presence of a second immigrant *Chrysopa* on Oahu, commonly coming to light. The adult does not feed upon plant-lice but eats honeydew freely. The species is similar to the American *Chrysopa externa* Hagen.



The ginger weevil, *Pteroporus subtruncatus*

Ginger weevil.—Mr. Swezey reported having received the determination of the ginger weevil from Dr. Guy A. K. Marshall of the Imperial Bureau of Entomology. Specimens had been sent to him by Mr. Muir. The species is *Pteroporus sub-*

truncatus Fairmaire, described from Fiji in Ann. Soc. Ent. France, 1881, p. 308.

Nesencyrtus kaalae.—Mr. Timberlake exhibited specimens of this Encyrtid, reared from the pupa of a *Nesoprosopis,* and collected in *Nesoprosopis* nests in rotten logs in Nuuanu Valley by Mr. Bridwell. The host is one of the smaller bees of this genus and probably *N. koae.*

DECEMBER 4th, 1919.

The 171st meeting of the Society was held in the usual place, President Giffard in the chair. Other members present: Messrs. Bridwell, Bryan, Crawford, Ehrhorn, Fullaway, Osborn, Pemberton, Potter, Rosa, Swezey, Timberlake, Willard and Williams.

Minutes of previous meeting read and approved.

The President read a communication from the Secretary of the Hawaiian Sugar Planters' Association advising of a contribution of $650., $150. to cover publishing deficit of 1919, and $500. for publishing fund for 1920. The latter amount to be considered an annual contribution for the future. A unanimous vote of thanks was voted to be communicated to the Planters' Association, and also to the President of the Society for his efforts towards securing this contribution.

The Treasurer's Report for 1919 showed a balance of $120.12,

Election of Officers for 1920:

President	D. L. Crawford
Vice-President	F. X. Williams
Secretary-Treasurer	D. T. Fullaway

Additional members of Executive Committee

W. M. Giffard
O. H. Swezey

PRESIDENTIAL ADDRESS.

A Review of the Organization of the Hawaiian Entomological Society and Brief Mention of Some of the More Notable Achievements in Hawaii by Its Members.

BY WALTER M. GIFFARD.

On this, the fifteenth, anniversary of the Hawaiian Entomological Society, it is fitting that the presidential address should be largely devoted to a review of the organization and to the significance of what has been done since the beginning. It is also appropriate that we should recall the objects which led to the formation of the society, and that we should review some of the more notable achievements by the pioneers in this field of labor in Hawaii, and by others who joined later to lend their energy and ability to the advancement of an all-important work.

It has been said, and with truth, that Hawaii has, in numerous instances, acquainted the world with new and valuable facts in the inexhaustible mines of entomological research, for these remote islands have been the laboratory of a remarkable series of intensely interesting and highly profitable experiments in the introduction of beneficial insects. When these successful tests, often fulfilled only after long and patient scientific field research, and at much expense, are considered in the aggregate, it is evident that Hawaii holds a most enviable record, and that the progress and practical results obtained by the entomologists in these islands more than equal anything of the kind that has so far been recorded from any other part of the world. The saving in money, to Hawaii's principal industry, cane sugar, is well nigh incalculable. Nor, heretofore at least, have Hawaii's entomologists ever taken the trouble to sound their own trumpets with regard to their achievements. Visiting scientists have remarked that, in their opinion, we are altogether too modest when we have something worth while boasting about. Hawaiian entomologists, it has

been remarked, have been inclined to confine their printed intelligence to the bare if not simple facts of technical description, avoiding what, in some fields of endeavor, would be a tendency to blare their triumphs to the world at large.

Three separate official staffs of entomologists were maintained in these islands at the time of the organization of the Hawaiian Entomological Society, the oldest of these staffs being the entomological division of the territorial Board of Agriculture and Forestry, which, as a matter of fact, dates back to 1893, in the days of the Provisional Government, when Mr. Albert Koebele was engaged by the administration to introduce lady-birds and other beneficial insects to prey on cottony-cushion and other injurious scales then existent in the islands, particularly in Honolulu.

It was in the early part of 1903, ten years later, that the territorial government organized the present Board of Agriculture and Forestry, its entomological division being made to include Albert Koebele, who was appointed to be superintendent, and Dr. R. C. L. Perkins, as assistant superintendent. Shortly afterwards, the late Messrs. G. W. Kirkaldy and F. W. Terry were added to the staff. As Superintendent Koebele was away on a search for beneficial insects, Doctor Perkins was in reality the head of the entomological organization, the work of which, more particularly, included the inspection, under new regulations, of all imported vegetable matter, the idea being to prevent, so far as possible, any further introduction of insect pests by way of the port of Honolulu.

As older members of this society will recall, Doctor Perkins and Messrs. Kirkaldy and Terry were appointed to the Board of Agriculture and Forestry under an arrangement with and mostly at the expense of the Hawaiian Sugar Planters' Association, and under this agreement much of their time was devoted to the study of insect pests affecting sugar cane, and to the search for and the introduction of beneficial insects to combat such pests. Due to the then recent ravages of the sugar cane leaf-hopper in all cane-fields throughout the islands, the

task set these scientists was not without many difficulties, and it was deemed essential to the successful conduct of the campaign against sugar-cane pests that the Sugar Planters' Association should establish and control its own entomological division, separate and independent of the entomological division of the territorial Board of Agriculture and Forestry. Therefore, assuming the whole expense, the Hawaiian Sugar Planters' Association, with the official co-operation of the Board of Agriculture and Forestry, assigned Messrs. Koebele and Perkins to undertake a search abroad for some effective enemy to prey on the cane leaf-hopper. Messrs. Kirkaldy and Terry remained with the Board of Agriculture and Forestry until the reorganization of the Sugar Planters' Experiment Station was complete, after which the late Mr. Alexander Craw was appointed to the Board of Agriculture and Forestry, as entomologist, to fill the position of superintendent in place of Mr. Koebele.

During the latter part of 1904, the Sugar Planters concluded the reorganization of their experiment station, adding thereto a division of entomology, taking over as members of the staff the entomologists above named, with the exception of Mr. Craw, who remained as superintendent of entomology with the Board of Agriculture and Forestry, and Mr. Jacob Kotinsky, a later appointee, who acted as assistant on the staff of the board, both of these gentlemen confining their work, in the main, to the inspection of imported plants and other vegetable matter, and to entomological inspection work around the city of Honolulu. At the same time, Mr. O. H. Swezey was specially engaged to assist in breeding parasites and in plantation inspection work, and Mr. Frederick Muir was engaged to continue further foreign entomological exploration on much the same lines as had been followed by Messrs. Perkins and Koebele.

In the meantime, the federal government, through the Bureau of Agriculture at Washington, had already established an agricultural station for the purpose of experimenting with and aiding diversified agricultural industries other than sugar cane,

and on its staff was an entomologist, Mr. D. L. Van Dine, who rendered valuable assistance to the small farmer in coping with fruit insect pests, and in aiding the local health authorities in mosquito control by the introduction of the top-minnows now so abundant and widely spread in our ponds and marshes.

So it will be seen that there were three separate staffs of entomologists in Honolulu—the staff of the Federal Experiment Station, the staff of the Planters' Association, and the staff of the Board of Agriculture and Forestry. Under the circumstances, it would not be remarkable if a certain amount of duplicating or overlapping should occur in entomological work, with the prospect of considerable waste of energy and time in future research, and for that reason, and because of the general interest taken in Hawaii's indigenous insect fauna, and the insect fauna of other countries which might be closely allied thereto, it appeared advisable that a society of entomologists be formed for the purpose of interchanging views on entomological subjects, to promote and encourage friendly relations among all who might in any way be interested in this particular science, and to engender the spirit of co-operation and co-ordination, in so far as was possible, among all the workers in Hawaii; and in the forming of this society all of the scientists above named became prominent pioneers.

When the society was organized, in December, 1904, it was practically understood, as now, that insects already in the Territory, and those from foreign countries closely allied thereto, whether of a beneficial or an injurious nature, should constitute the dominant feature of papers and discussions presented, or made the subjects of consideration at meetings of the society.

There were fifteen members at the time of organization, namely, R. C. L. Perkins, G. W. Kirkaldy, F. W. Terry, J. Kotinsky, O. H. Swezey, A. Koebele, Alexander Craw, W. M. Giffard, W. A. Bryan, D. L Van Dine, R. S. Hosmer, C. F. Eckart, C. J. Austin, Brother Matthias Newell, and Mrs. O. H. Swezey. Of this number eight were entomologists who were actively engaged in professional work in the Territory, while

the others were interested in entomological work or allied scientific pursuits. Subsequently, Brother Matthias Newell and A. Koebele were elected honorary members. In 1909 this honorary membership list was increased to five by the addition of Dr. R. C. L. Perkins, Dr. David Sharp, and the Rev. Thomas Blackburn. Mr. Blackburn had been identified with our indigenous insect fauna in previous years, having been a resident of Honolulu from 1876 to 1882, during which period, in his leisure hours, he devoted much time exploring the forest regions in the vicinity of Honolulu, collecting and studying endemic insects, and later describing many of these. This pioneer work of Mr. Blackburn later led to the systematic scientific exploration of these islands by Dr. R. C. L. Perkins, engaged for the purpose, and the publication of the "Fauna Hawaiiensis" by a joint committee appointed by the Royal Society of London, and the British Association for the Advancement of Science. The Bishop Museum, of Honolulu, also rendered valuable assistance in making the publication possible.

Dr. David Sharp, a noted British entomologist, also had done pioneer work in connection with our indigenous insect fauna, having published his first paper in connection therewith as far back as 1878, and had since then contributed and edited many very valuable papers included in the "Fauna Hawaiiensis".

Within a year of the organization of the Hawaiian Entomological Society, the membership had increased from fifteen to twenty, without any solicitation on the part of original members, and from time to time there have been additions, as, at times, there have been deaths and resignations, so that, at this time the society has a membership of twenty-nine, and a dozen members are actively engaged in various branches of entomology.

The first and many of the subsequent meetings of this society took place in the library of the Board of Agriculture and Forestry, and it was there that the small band of enthusiastic entomological workers gathered to discuss and complete

organization, laying the foundation of what has developed into an institution peculiarly serviceable and desirable for the interchange of views, for important discussions, and for the presentation of valuable entomological information, bearing on local matters as well as matters of foreign import but related to Hawaiian entomological interests, all of which has gradually perfected a spirit of harmonious co-operation and co-ordination along certain lines of systematic research and labor, which, otherwise, might never have been possible.

The Hawaiian Entomological Society is not only to be congratulated on the harmonious relations which have always existed among the active members, but it is to be most heartily congratulated because of the important and far-reaching results which have been achieved by many of the men who have been most actively engaged as members of this society.

Working in their official capacities, members of this society have, during the fifteen years of the organization, scored numerous entomological achievements of far-reaching economic importance. One of the principal reasons for so much entomological work having been undertaken may be found in the fact that the ravages of the hopper on sugar cane, from 1902 to 1904, called for strenuous and continuous action. One might say that the society owes its existence to the leaf-hopper. To this cause, and the fear of further introductions of insect pests, and the paramount necessity of inspection and the control of all importations of plants and other vegetable matter, must also be attributed the formal organization of the Board of Agriculture and Forestry and its various divisions, including that of entomology. The excellent results accomplished in the work of controlling the cane leaf-hopper by the practical use of its natural enemies are too well known by the members of this society, and others, to require any detailed review in an address of this nature. The immense monetary saving to the sugar plantations during 1905 and 1906, and in the years following, has won the appreciative acknowledgment of the

sugar planters, than which there could be no more eloquent testimony to the success of our entomologists.

In 1906 Mr. Muir undertook an exploration in search of a parasite on the sugar-cane borer. He discovered one in 1908, introducing it in Hawaii two years later. Such was the success in breeding and establishing this parasite that the cane-borer pest has decreased to a very considerable extent, the sugar yield on affected plantations greatly increasing, and the losses, which for years had been large, have been minimized. Practically the same procedure was observed with reference to the Anomala beetle, which was affecting some Oahu plantations, the importation of a predatory wasp having so far controlled the situation.

There are many other achievements in economic entomology in which prominent active members of our society might be mentioned. There are the introductions, by Professor F. Sylvestri, D. T. Fullaway and J. C. Bridwell, of fruit-fly parasites from Africa and India. In 1913 it was very difficult to secure Hawaiian-grown fruit and cucurbits that were not affected by the fruit-fly, but now we are enabled to enjoy a good percentage of these. Mr. H. T. Osborn discovered a parasite on the corn leaf-hopper, in the Philippines, which was introduced into Hawaii and bred and distributed by D. T. Fullaway. This pest is now being very effectively reduced. Many parasites on scale and other insect pests affecting agriculture and horticulture have been searched for, discovered, and introduced into Hawaii by many members of our society in their several official capacities. Many of these beneficial insects have proven of appreciable value to the Territory as a whole.

In a general way the society has derived much benefit from the work of all our active members and has frequently enjoyed the advantage of many valuable papers and observations contributed by them from time to time. These papers have been, in most part, on subjects of our endemic insect fauna, and quite naturally so, as the studies and life histories

of the native insects of Hawaii have to most of our members formed a great part of their relaxation from the duties of official routine, and in addition thereto are one of the chief purposes of the organization of our society.

Thus it will be seen that during the past fifteen years our members, while engaged in their official duties, or otherwise, have performed notable work and have accomplished results that reflect great credit to themselves, to the society, and to the organizations by which they are employed. These islands, and the organizations involved, have been and are now fortunate in having such efficient workers.

It would be impossible to estimate the full measure of good, to our members and to entomology in Hawaii, that has grown out of the friendly co-operation, the earnest fraternizing for discussion and consultation, and, occasionally, the enthusiastic parties made up for excursions into the forests in quest of specimens of native insect life. Much of this is welcome relaxation from the often tiresome routine of daily official duties. In this manner our society has contributed toward the very friendly feeling, one for another, that characterizes its membership.

A few statistics will assist in conveying some idea of what the society has been doing. Since the time of its organization, fifteen years ago, 171 regular meetings have been held, and, up to the end of 1918, members have contributed 221 technical papers, covering 1113 printed pages, dealing altogether or in part with allied Hawaiian and foreign entomological subjects. These are to be found in the volumes of the society's proceedings. We are now entering upon the publication of the second part of Volume IV, the volumes as a whole having covered 1262 pages of print, exclusive of the illustrations.

It is also interesting to note, in this connection, that our association is the only entomological society this side of the Rocky Mountains that regularly publishes proceedings and descriptive matter.

Four of our most respected and most active members have

passed away from mortal associations, but their work remains. Their valuable contributions of papers to this organization remain as monuments to their memory. Though departed from these visible fields of research in which we labor, their services to the enrichment of science will ever be of benefit to those engaged in entomological study, and their accomplishments will remain fresh not only in the minds of those who worked here with them, and in the thoughts of their associates, but they will also shine in the annals of scientific history. I refer to Messrs. Kirkaldy, Terry, Craw and Blackburn.

For the past few years ill-health has deprived us of the presence of Doctor Perkins, whose knowledge of Hawaii's indigenous insect fauna was of paramount assistance to many of our members specializing along this line. Albert Koebele has also been obliged to leave us because of failing health, and his genial presence and hearty co-operation have been greatly missed.

In concluding this address, I feel moved to say a word concerning the future. If we may build our expectations of what is to come, on our experiences and accomplishments of the fifteen years of our progressive existence as an organization, we may go forward with confidence and every encouragement. But we must not forget that, in order to maintain our good record, and in order to attain to still greater achievements, we must never lose sight of the chief essential to the success of any society, and that is earnest co-operation. For example, all duplication and over-lapping of work among the members should be carefully avoided. Sometimes this cannot be helped, but if we agree among ourselves that the families or groups of insects to be studied shall not be taken up by two men at the same time, we shall save much valuable time, energy and patience.

I would like to suggest that more illustrations or figures accompany the papers contributed to this society. Not so many, of course, as would make it financially impossible to publish them all, but enough to facilitate the reader's ready

grasp of the subject-matter. A timely figure frequently conveys to some minds at a glance what would require several minutes to be conveyed by means of words. Also, let us remember to continue to assist one another with material for study, whenever opportunity offers. Constantly one is coming across material for which one may not have immediate use, but which may prove most welcome to some other who has, perhaps, been looking for that very material.

It was but a generation ago that very little scientific ambition was exhibited in the agricultural world, but once curiosity and enthusiasm were aroused by pioneers in research work, and it gradually came to be realized that vast fortunes could be saved through the development and application of knowledge, economic entomology began to take long strides, until, when the Hawaiian Entomological Society was organized, this science was beginning to surprise the world with its successive wonders, and, as already intimated, Hawaii, since her needs were urgent and her promoters were men of resource and imagination, welcomed the immense benefit, sparing neither time nor expense to free herself of insect pests.

At this point it is not inappropriate to remark that the financial assistance of the Hawaiian Sugar Planters' Association has played no small part in the success of our society, a fact that is thoroughly appreciated by this organization, and the Planters' Association, I am sure, has our most sincere thanks.

There is an immense interest in economic entomology in these busy days of rapid scientific advancement along all lines of human endeavor. Hawaii will do her part in the future, as she has done her part in the past. The world is forging ahead, and, at the same time, impatiently clamoring for solutions to a host of problems—social, economic and industrial. As marvelous as have been achievements in the realm of economic entomology, still greater problems invite solution, and already we may be on the threshold of some startling discoveries. Trained intellects are today more in demand than ever before.

and I am sure you will agree with me when I say that truly effective entomological work demands minds very carefully prepared along particular lines. Yes, there are greater developments close ahead of all workers in entomology, and, without bragging for the Hawaiian Entomological Society, I feel confident that Hawaii will continue to maintain her most creditable position in the scientific race, and that her entomologists will not fail to secure their share of the honors in whatever advancement is recorded.

There are still many entomological problems of importance facing Hawaii today which can only be solved by the most careful study and patient scientific research. The purpose of this address is not to go into detail as to such problems, but they are well known to our most active members. It suffices to say that the solution of one or more of any of these by our entomologists cannot but bring additional credit to them, to the Society and benefit to the Territory. The Society also continues to feel the necessity of further research and biological work in connection with our endemic insect fauna, and whilst considerable has been done on these lines in past years by our members, there still remains much left undone and a part of which it is hoped will be undertaken in the near future.

I very much regret that I have been prevented by illness, and by absence from the Territory, from presiding more often at our meetings during the past year, and I want to take this opportunity to express my thanks to Vice-President D. L. Crawford for taking my place and assuming the duties of the office, whenever it was necessary during that period. These same circumstances have compelled me to very hurriedly and, perhaps, somewhat disconnectedly, deal with the present subject as the presidential address for the year, and I therefore ask the kind indulgence of the members because of any important omissions I may have made.

PAPERS.

Cerotrioza (Psyllidae, Homoptera).

BY D. L. CRAWFORD.

In a previous paper on Hawaiian Psyllidae[1] the genus *Cerotrioza* was erected for one species apparently native on the island of Oahu. There were referred to this same genus two species from the South Pacific which seemed to be related to the Hawaiian species. Examination of additional specimens representing the same as well as new species both from Hawaii and the South Pacific has convinced me that a change must be made in this genus.

Cerotrioza should be a little more restricted to include two Hawaiian species (one new and described below), while the South Pacific species should be referred to the genus *Leuronota* Crawford[2] already established and embracing several species from various parts of the world.

CEROTRIOZA redefined—Vertex as long as broad or longer, produced in front into two rounded epiphyses extending over and often beyond insertion of antennae; genae slightly swollen around insertion of antennae but not produced into conical processes. Remainder of original definition valid.

This genus in Hawaii is apparently a derivative of some species of *Leuronota*, for the two genera are similar in the elongate, unarched body and elongate wings with similar venation but differ in the structure of the head:—

Cerotrioza—Genal cones wanting; vertex longer than broad or at least as long as broad, produced in front into two large epiphyses.

Leuronota—Genal cones present, porrect, half or fully as long as vertex; vertex not as long as broad, sometimes produced into two small epiphyses close to front ocellus.

The following species have been or are now referred to the genus *Leuronota*:—

L. maculata Crawford[3]—Southwestern United States.

L. acutipennis Crawford[3]—Nicaragua.

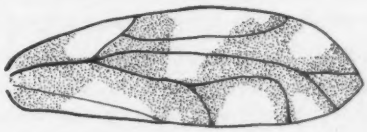
L. longipennis Crawford[3]—Florida.

1 Proc. Haw'n. Ent. Soc. III, No. 5, p. 454, April, 1918.
2 United States Nat. Mus. Bul. 85:67, 1914.
3 United States Nat. Mus. Bul. 85:67-70, 1914.

L. minuta Crawford[4]—Bengal, India.
L. corniger. Crawford[5]—Singapore.
L. microceras Crawford[5]—Borneo.

Cerotrioza bridwelli n. sp.

Similar to *C. bivittata* Crawford but differing as follows: Vertex about as long as broad, discally impressed deeply on each side of median suture. Lateral vitta wanting or scarcely discernible; color fulvous.



Cerotrioza bridwelli. Forewing; stippled areas are colored brown

Forewings without axial vitta, but irregularly maculated as shown in the accompanying illustration; cubital cell more nearly rectangular than in the other species.

Described from one female taken by J. C. Bridwell at Punaluu, Koolau Mountains, Oahu, 1916.

A Note on Apterocyclus (Coleoptera, Lucanidae).

BY H. T. OSBORN.

While collecting for several days in the vicinity of Kokee, Kauai, in June of this year, fifteen presentable specimens of this little-known Kauai genus were obtained. It was after several days of tramping and collecting that I accidentally stumbled onto their location. A new forest trail was in course of construction on the steep slope leading into the Kauaikinana stream at about 3,500 feet elevation and while descending this

[4] Records of Indian Museum, VII, Part 5:433, 1912. Described as *Allotrioza minuta* but must be referred to *Leuronota* as *Allotrioza* is in synonymy.

[5] These two species were placed in *Cerotrioza* in a paper which is in press, to appear in the Philippine Journal of Science, but they are now referred to *Leuronota.*

a broken-up beetle was observed in the path. A closer examination revealed a number of dead and rotting grubs in the newly packed soil. A close watch was then kept while the Japanese dug up some 50 or more yards of new trail. The results so far as obtaining adult beetles were concerned were very meagre, only four being secured alive. The grubs, however, were present in large numbers, certainly not less than 500 of various sizes being turned over. The grubs occurred from two to eight inches beneath the surface in the loose soil about the forest trees, but no definite evidence of feeding was observed.

On June 12th while following the auto road from Halemanu to Puu Ka Pele, 3,300 feet elevation, I was surprised to notice two live beetles in the dust in the auto tire track. They were lying on their backs and seemed unable to turn over and escape. Close watch was then kept and in a distance of about a mile a number of beetles were found in this same position, though most of them were crushed and worthless. In all, eleven of these found along the road were in good enough shape for preservation.

At Puu Ka Pele in digging with a small hand trowel about the roots of a clump of old Koa trees a half-dozen grubs of *Apterocyclus* were found, while the remains of dead beetles were found in the trash and debris under the trees.

From these few facts it would seem that instead of being rare the beetles of this genus are quite abundant, and furnish an interesting subject for further study. The Puu Ka Pele specimens appear to be a different species from those obtained in the Kauaikinana Valley.

Some New Hawaiian Lepidoptera.

BY O. H. SWEZEY.

During the past five years specimens of new species of moths have been accumulating. These have mostly been reared specimens from caterpillars found in various places, and from

that reason have the greater interest. I now give descriptions of a number of these that they may go on record. The type specimens are deposited in the collection of the Hawaiian Entomological Society.

Caradrinidae.

Euxoa wikstroemiae n. sp.

♀. Head and thorax pale brownish grey; antennae and palpi of the same color, but the median joint of the palpi dark brown on the outer side except at the apex. Legs nearly uniformly concolorous with the thorax; abdomen concolorous, but paler.

Forewings pale brownish grey; subbasal, first, and second lines paler, but a little darker edged; the first line strongly waved; second line feebly waved, very indistinct; orbicular and reniform partially outlined with pale brown; a median browner shade clear across the wing; two black spots near termen, one on each side of vein 5, the anterior spot the larger. Hindwings nearly uniform pale brownish grey, paler than the forewings; a fuscous discal mark and a terminal series of blackish dots; underside with a distinct dentate post medial line, the discal mark also showing plainer than on upper side. Expanse, 39-40 mm.

Quite distinct from all other endemic Hawaiian species of the genus. Described from 2 ♀ ♀ reared from two small caterpillars found on a *Wikstroemia* bush at top of west wall of Waimea Canyon, Kauai, at an elevation of about 1500 feet, February 14, 1915 (Swezey). The caterpillars obtained their full-growth and entered soil to pupate March 24th, and the adult moths appeared April 22nd.

Caterpillar. The full-grown caterpillar was 40 mm. in length; nearly uniformly dark fuscous, minutely spotted with paler, whitish on ventral surface; head light ferruginous; cervical shield black with a broad yellow discal patch widest posteriorly, a median white line which extends indistinctly onto the two following segments; setae very short, pale, each in a black dot; anal shield black with several yellow spots; spiracles oval, entirely black.

Pupa. 20 mm. long; yellowish brown, infuscated on dorsum of metathorax and abdomen; a dorsal transverse band of small pits near anterior margin of 5th, 6th, and 7th abdominal

segments; wing-sheaths, antennae-sheaths and posterior leg-sheaths extend to apex of 4th abdominal segment; cremaster with two short diverging spines, thick at base, dark reddish, apical half whitish.

I have found apparently the caterpillars of the same species, but failed to rear them, at the following places on Oahu, and always on *Wikstroemia:* October 25, 1914, on the ridge back of Alewa Heights; April 30, 1916, on Waialae Nui ridge; July 9, 1916, on the east side of Mt. Kaala near the top. The caterpillars are found on their food-plant in the daytime, a different habit from the other species so far as known. Having a tree for food-plant is also an unusual habit for the moths of this kind in Hawaii.

Euxoa kerri n. sp.

♂, ♀. Head and thorax grey, collar with a slight brownish tinge; palpi somewhat sprinkled with fuscous on the outer side; antennae grey, that of male shortly bipectinate for about two-thirds of its length; legs pale grey, tibiae and tarsi marked with fuscous; abdomen pale grey, anal tufts slightly yellowish.

Forewings brownish ochreous to brownish fuscous, the paler portions at base and termen; subbasal, first and second lines whitish, edged with brownish fuscous; first line strongly waved, much bent inwardly on vein 1; second line slightly waved, strongly bent outwardly on vein 1; orbicular oval, brownish outlined, in one specimen (♂) filled with pale ochreous, in the other (♀) partially filled with fuscous; reniform partially brownish outlined, pale ochreous in the male, partially filled with fuscous in the female. Hindwings of male pale grey, the veins somewhat fuscous; of female light fuscous, paler towards the base. Expanse, 38-42 mm.

Described from a male and female reared from two small caterpillars found on plants of *Boerhaavia tetrandra,* collected by Dr. Wm. Kerr of the U.S.S. "Rainbow", on French Frigate Shoals, October, 1914. These caterpillars were fed on *Portulaca oleracea* and grew to maturity, and pupated on January 5th and 14th respectively. The moths appeared on January 20th and February 8th.

Caterpillar. Length when full-grown about 50 mm. It resembles the caterpillar of *Agrotis crinigera* except that the head

is paler, almost entirely pale yellowish testaceous with slender black line along paraclypeal suture where *crinigera* has quite a wide blackish mark. The cervical shield is also paler than that of *crinigera.*

Pupa. Similar to that of *crinigera;* length, 20 mm.

. SPHINGIDAE.

Celerio perkinsi n. sp.

Head and thorax olive brown, a lateral stripe on head and margins of patagia whitish to ochreous. Antennae dark fuscous, apex whitish except the very tip, which is fuscous. Palpi concolorous with the head, paler at base. Legs greyish brown. Abdomen nearly black above, with a median streak of the same color as the thorax, the posterior margins of segments with fringe of white scales except in region of the median streak. Thorax and abdomen below ochreous, with faint pinkish tinge. Forewings dark brown, much suffused with greyish and ochreous scales and hairs; lines fuscous brown, first line indistinct except near costa, preceded by a triangular very dark fuscous dorsal patch; median line curved inwardly towards costa and outwardly towards dorsum; second line nearly parallel with median but closer to it dorsally, with outward crenulations between the veins; dark fuscous marks at terminations of the veins; an inwardly oblique short blackish bar at apex; a discal brownish fuscous mark and another at end of cell; a large somewhat triangular brownish patch with its base on dorsum between second line and tornus; cilia dark fuscous at ends of veins, paler between, ochreous towards tornus. Hindwings very dark fuscous or nearly black, with a median band of pink which is nearly obsolete towards costa, wide at anal angle; cilia ochreous. Under side of wings with a pinkish tinge, most intense towards dorsum of each wing. Expanse of wings, 57-65 mm.

Somewhat resembles *wilsoni* in the pattern of the forewings, but differs from that species particularly in the white segmental marks on the abdomen, instead of orange as in *wilsoni,* and the pink band on the hindwing where it is orange in *wilsoni.* It is also of smaller size.

HAB. Palolo Crater, Oahu, Sept. 3, 1906, one specimen collected while at rest on a tree trunk (Swezey); one specimen collected on lower part of Mt. Tantalus at upper part of Manoa Valley, Oahu, Oct. 5, 1919 (Bryan); one specimen reared from a small caterpillar given me by Mr. J. A. Kusche, who found it feeding on leaves of *Straussia,* Mt. Tantalus, Oahu, Oct. 11, 1919. This caterpillar was fed on *Straussia* leaves, and finished its growth by Oct. 25, when it

spun up in moss of the breeding jar. It pupated four days later, and the moth emerged Nov. 19, after three weeks in the pupal stage.

I have named this moth for Dr. Perkins, who was with me when I found the first specimen, and at once recognized it as different from the known species. The specimen, however, was too much battered and abraded for description. This is now made possible by the reared specimen in good condition, and the fairly good specimen collected by Mr. Bryan.

NOTE.—Recently the Bishop Museum has received, by way of exchange, a pair of *Celerio galli intermedia* Kirby from Mr. B. Preston Clark of Boston. These specimens were collected in Alaska. The species is widely distributed in North America.

Comparing these with the Hawaiian *Celerios*, there is a striking similarity in the color patterns of the wings, and the abdominal markings. The similarity is most striking with our *C. calida* (Butler). It seems to me to indicate the American origin of the ancestors of the Hawaiian *Celerios*. Mr. Clark, in letter, also concurs in the belief that the Hawaiian Sphingidae are allied to those of America.

PYRAUSTIDAE.

Mestolobes chrysomolybdoides n. sp.

♀. Head, thorax and abdomen dark leaden-fuscous; palpi light yellow; antennae dark fuscous; legs greyish-fuscous, tarsi whitish ringed. Forewings nearly black, almost completely suffused with shining leaden scales except at first and second lines; first line near middle of wing, slightly curved, black with a short yellow streak in costal half; second line near termen, broad, black, outwardly curved and broader a little beyond middle; cilia to middle of termen white, dark fuscous at base, beyond middle of termen grey, dark fuscous at base. Hindwings dark fuscous-brown, basal half a little paler; cilia white, fuscous-brown at base. Expanse of wings, 12-13 mm.

HAB. Mt. Kaala, Oahu, about 2500 feet elevation, March 4, 1917, two specimens reared from larvae in moss on tree (Timberlake).

Near *M. chrysomolybda* Meyr., but the palpi are wholly yellow, and the leaden coloration is not broken up into four distinct fasciae as in that species, and the latter does not have the white cilia of the forewings.

Mestolobes chrysomolbdoides.

Mestolobes quadrifasciata n. sp.

♂, ♀. Head brownish fuscous, a vertical white line extending forward from base of each antenna, a few white scales on outer side and behind insertion of antennae, collar white; antennae brownish fuscous spotted with white, in male thicker in diameter and finely and densely pubescent; palpi clothed with long loose scales, brownish fuscous, with a line of white scales continuing from the white collar, and some white scales nearer the apex. Thorax brownish fuscous, pronotum with posterior line of white scales, patagia bordered with white outwardly. Legs ochreous, tarsi fuscous, ringed with white. Abdomen ochreous to greyish fuscous, apical margins of segments paler. Forewings ochreous, with fuscous scales somewhat mixed and a tendency to border the four transverse white fascia representing the subbasal, first, median and second lines; subbasal line at one-fourth of costa, angled outwardly at middle; first line at one-third of costa, a little outwardly curved at middle, sometimes interrupted a little beyond middle; median line a little beyond middle of wing, hardly reaching dorsum; second line at three-fourths of costa, nearly evenly curved outwardly, reaches dorsum very close to tornus; a costal white dot just before apex; a terminal series of white dots among fuscous scales; cilia pale fuscous, dark fuscous at base. Hind-wings greyish fuscous, cilia the same, a little darker at base. Expanse of wings, 9-11 mm.

A small species, distinguished by the four nearly complete transverse white fasciae on the forewings.

Hab. Palolo, Mt. Olympus, Mt. Konahuanui, and Kaumuahona, Oahu, 1908-1914 (Swezey). A common species in the mountains near Honolulu.

Hyponomeutidae.

Semnoprepia pittospori n. sp.

♂ Head and thorax white, face and patagia fuscous; palpi with middle joint fuscous on outer side, terminal joint whitish; antennae dark fuscous; legs with femora pale ochreous, fore and middle tibiae and tarsi dark fuscous; hind tibiae pale ochreous, hind tarsi marked with fuscous. Abdomen very light fuscous, anal tufts pale ochreous. Forewings dark fuscous brown, with a whitish streak on dorsal margin; a short dark fuscous mark in the fold and just at the middle of the anterior edge of the dorsal whitish streak; apical cilia dark fuscous, cilia at tornus whitish, between this and apex spotted, fuscous alternating with whitish. Hindwings pale grey, cilia whitish. Expanse, 13 mm.

Described from 3 ♂ ♂ reared from dead *Pittosporum* wood, Kuliouou, Oahu, June 25, 1916 (Swezey).

Semnoprepia coprosmae n. sp.

♂, ♀. Head, thorax and palpi ochreous brown; antennae dark fuscous, basal fifth nearly black; legs with femora ochreous, fore and middle tibiae and tarsi dark fuscous, hind tibiae ochreous, hind tarsi marked with fuscous; abdomen ochreous. Forewings nearly uniformly ochreous brown; three conspicuous dark fuscous spots, one on middle of fold, one in the cell at middle of wing, one at end of cell; a series of small dark fuscous marginal spots extending around apex of wing; cilia ochreous. Hindwings pale grey without markings; cilia pale ochreous. Expanse, 18-23 mm.

Described from seven specimens (type ♂) reared from larvae feeding in live wood of *Coprosma longifolia* at Malamalama, a ridge on the windward slope of Mt. Konahuanui, Oahu, October 8, 1916 (Swezey).

The larvae of this genus are elongate and whitish and usually feed in dead wood; but the larvae of this species were found in the live wood and were quite abundant in the trees of the locality. The injury by them caused dead places in the tree trunks and branches, and a very rough, gnarlly appearance where the growing of the tree had partially overgrown the injuries. Pieces of branches containing larvae were brought in, and the moths issued November 20 to December 14. A series of 18 *Sclerodermus semnoprepiae* Bridwell also issued from this material, and cutting up some of the wood, it was

demonstrated that this parasite had bred on the larvae of *Semnoprepiae*. It was found to be a new species and described later by Mr. J. C. Bridwell.

PLUTELLIDAE.

Plutella capparidis n. sp.

♂, ♀. Head, thorax and abdomen dirty white. Antennae dirty white, with dark fuscous spots on apical half. Palpi brownish fuscous on outer side. Patagia brownish fuscous. Forewings brownish fuscous, with a wide dorsal streak of creamy white, having an oblique extension from near the tornus to the costa a little before apex, this streak irregularly sinuate on the anterior edge, the anterior edge nearly white and the brownish fuscous area of the wing has black scales on the edge bordering this streak, there are also a few scattered black scales on the dorsal margin; a narrow creamy white spot in basal third of costa, a larger some-

Plutella capparidis.

what triangular patch at middle of costa, each of these having black scales in the edge of the surrounding brownish fuscous area and the larger spot has a small spot of black scales on costa; cilia light fuscous mixed with paler scales, and a black line at the base. Hindwings and cilia very light fuscous. Anterior and middle legs dark fuscous, tibiae and tarsi with white rings; posterior legs dirty white, tarsi fuscous marked. Expanse of wings, 8-8.5 mm.

A very distinct species from *P. maculipennis* and *P. albovenosa*, the other species known to occur here. Described from 20 specimens reared from larvae found by Mr. J. C. Bridwell feeding on the leaves of *Capparis sandwichiana*.

HAB. Ewa Coral Plain, Oahu, June 8, 1919 (Bridwell).

The light green larvae feed mostly on the surface of the leaves, eating one epidermis and the parenchyma and leaving the other epidermis, which shows as dead spots in the leaves.

Occasionally the larvae have a tendency to mine within the leaf. Usually they are exposed, but sometimes covered by a slight web. The cocoon is made on the surface of the leaf. It is not so distinctly of an open network structure as is usual with *Plutella,* tho there is a tendency for it to be of fine network with a thin outer covering. It is denser than usual for *Plutella,* but thin enough so that the pupa can be made out inside.

The lot of larvae brought in by Mr. Bridwell, from which the 20 moths were reared, proved to be very highly parasitized by *Chelonus blackburni.* Thirty-three of this parasite issued from the lot, making a parasitism of 62%.

Tortricidae.

Capua reynoldsiana n. sp.

♂, ♀. Head, thorax, legs, palpi and antennae cinereous, the antennae somewhat fuscous ringed; abdomen pale ochreous, anal tufts concolorous. Forewings cinereous with numerous scattered spots of dark fuscous scales, the three largest spots in a line beginning with one on costa near base and extending obliquely backwards, about a dozen of the spots are on the costa; cilia cinereous. Hindwings cinereous with a slight ochreous tinge; cilia cinereous. Expanse, 15-20 mm.

Capua reynoldsiana

Described from a series of 29 specimens reared from larvae and pupae found on leaves of *Reynoldsia sandwicensis;* 7 of them from Niu, Oahu, Feb. 10, 1918; 11 from Wailupe, Oahu, April 21, 1918; 11 from Kunia, Oahu, November 20, 1918 (Swezey).

The caterpillar is green and spins together leaves to feed between. It pupates in spun-together leaves. The pupa is brown, 7-10 mm. long, with the usual two dorsal transverse rows of minute spines or serrations on the abdominal segments.

From the lot of caterpillars and pupae collected at Wailupe, the following parasites issued: 1 *Echthromorpha fuscator,* 1 *Pimpla hawaiiensis,* 1 *Cremastus hymeniae,* 3 *Chalcis obscurata,* and 1 *Chalcis obscurata* was dissected from a cocoon of *Cremastus hymeniae.*

Capua tetraplasandra n. sp.

♂. Head and thorax orange brown; antennae light fuscous, orange brown at base; palpi orange brown outwardly, whitish on inner side; legs ochreous, the anterior pair pale brown below; abdomen grey ochreous, the anal tufts yellowish. Forewings orange brown with numerous spots of metallic-tipped scales having a bluish tinge in certain angles, these spots arranged in transverse rows; a broad oblique darker brown band extends from outer end of costal fold to tornus, a faint indication of a similar band extending from outer end of costal fold to anal angle, in both bands some groups of black scales; the somewhat triangular area between these bands suffused dorsally with lemon yellow, and with three black spots on hind margin; terminal cilia ochreous with a basal black band, tornal cilia entirely black. Hindwings light fuscous, the costal portion pale; cilia pale, fuscous at base. Under side of wings with numerous fuscous bars. One specimen has the ground color of the forewings paler, and more black scales in the oblique darker bands, also a sprinkling of fuscous scales in apical third. Expanse, 16-17 mm.

Described from two males reared from larvae in fruits of *Tetraplasandra;* the type from Kaumuahona, Oahu, November 17, 1918; the other specimen from Wailupe, Oahu, April 21, 1918 (Swezey).

Tineidae.

Gracilaria neraudicola n. sp.

♂, ♀. Head creamy white; antennae brownish, basal segment pale; palpi whitish, median joint fuscous at apex, terminal joint with fuscous band at middle and at apex. Thorax brownish fuscous, pale in middle

and posteriorly; legs ochreous, anterior and middle tibiae and tarsi and posterior tarsi fuscous marked. Forewings brownish fuscous, with three dorsal outwardly-oblique white streaks widened at base and margined with a few black scales, somewhat curved apically, the third one nearly connected with a white slender outwardly-oblique black-margined line at three-fourths of costa, beyond this white line three or four white costal spots; a round black spot at apex with a few pale bluish scales, a few pale bluish scales between this spot and the third dorsal white streak, sometimes this area ochreous; apical and terminal cilia brownish, paler near base and black at extreme base, tornal cilia very pale brown. Hindwings and cilia pale brown. Abdomen pale brownish. Expanse of wings, 7.5-8 mm.

Resembles *epibathra* Walsm. and *hibiscella* Sw., but a smaller species, the ground color of forewings darker, and slight differences in apical markings. Described from 6 specimens reared from mines in leaves of *Neraudia melastomaefolia*.

Hab. Two specimens Punaluu, Oahu, June 11, 1916, and 4 specimens Waiahole, Oahu, August 13, 1916 (Swezey). A series of five specimens reared from leaves of *Pipturus albidus* at Pahoa, Puna, Hawaii, September 20, 1918 (Swezey) seems to be the same species. *Neraudia* and *Pipturus* are near related trees, and it is not unlikely that the same species might attack both plants, tho of three species of *Philodoria* mining *Pipturus* leaves, not one of them has yet been found mining *Neraudia* leaves.

Miscellaneous Notes on Hymenoptera, 2nd Paper, With Descriptions of New Species.

BY JOHN COLBURN BRIDWELL.

25. Bathymetis sp., a Cryptine Parasite of Siphona stimulans and Other Dung Fly Larvae.

Among the parasites of dung flies secured by Mr. A. Koebele in Germany and Switzerland in his search for parasites of the hornfly and sent to Honolulu for liberation, was a species of *Bathymetis* which the literature at hand does not permit us to identify. Specimens in the collection of the

Hawaiian Sugar Planters' Association show that it was bred from material sent in 1908, 1909, and 1911.

Mr. Swezey (Planters' Record 2:360-366, 1910) records breeding it from some lots of material received October 15, 1909. Some parasites had already emerged and died, twelve were still living and twenty more emerged during the following week and a new generation was secured, and by November, eight adults of a new generation were secured from dipterous puparia in cow dung, the parasite ovipositing in the puparia. Subsequent sendings received from Oct. 28 to Jan. 7, 1910, produced about 475 parasites and from these and the parasites secured by breeding, colonies of 20 females and 20 males were liberated in Manoa Valley (Nov. 1909); 21 females and 39 males in Nuuanu Valley (Nov. 1909); 26 females and 34 males at Waialae Dairy; 26 females and 34 males (Nov. 1909) and about 12 females and 30 males (May, 1910) also on Oahu, the exact locality not designated, and on Maui, at the Grove Ranch, 11 females and 17 males (Jan. 1910); and a colony of 16 females and 34 males were sent to the Parker Ranch on Hawaii for liberation (Dec. 1909). Mr. Swezey also records (*Op. Cit.* 7:258, 1912) receiving a shipment from Switzerland on Nov. 29, 1911, from which 14 females and 30 males emerged during the next two months of which some were liberated.

He found that with the advent of the winter season with its slight reduction of temperature most of the parasites went into a hibernating condition on reaching full larval growth, some keeping dormant in this way from December until May.

It is interesting to note that there is a single male of this species in the collection referred to, bred out January 4, 1912, from a puparium brought down from Manoa Valley by Mr. Muir. I cannot find that the species has been seen since. It does not seem that the species could in any case prove very important in the control of the hornfly, since it attacks the puparium and this in the horn fly is tightly enclosed in the hardened dung so that the parasite would have

great difficulty in penetrating to it, its ovipositor being too short to penetrate to any great distance. It is also not in any way a special enemy of the hornfly but apparently attacks any muscoid puparia it encounters.

26. Aspilota konae Ashmead.

This species has been taken in recent years on Oahu only in the mountains; on Mt. Kaala, in Wailupe, Palolo, Waimano and Opaeula valleys by Swezey, and from Mt. Kaala, Palolo and Kuliouou by Timberlake.

In January or February, 1914, the tree shells of the genus *Achatinella* were found down on the paths along the Castle trail in large numbers and from them were bred the Sarcophagid *Dyscritomyia* sp. From one of the puparia of this fly 5 or 6 Alysiids were bred. In the press of other work at the time this material was probably all lost, but I am inclined to believe that it was this species which emerged. In any case it has so far always been taken in the regions where these flies are found. It would not be surprising if it should prove to be an endemic species.

The variation in the number of antennal joints in the species is most remarkable. I have seen females with 26 joints and others with but 18 while the type was described as having 28 joints.

27. Table of Some Species of Hawaiian Braconidae.

With the exception of one or two species, the Braconidae found in the Hawaiian Islands are immigrant forms brought in by the ordinary operations of commerce or, in some instances, purposely introduced in the effort to control obnoxious insects. In all about forty species are now known to be established and it is desirable for the use of local workers to have the species tabulated. The writer has recently tabulated* the species falling into the sub-family long known as the Braconinae but which through the vicissitudes of type

*Proc. Haw. Ent. Soc., IV, No. 1, p. 113, 1919.

fixation have required a new group name. For this group Gahan has proposed the name Vipiinae**. This name apparently cannot stand. In the first place the genitive of *Vipio* is *Vipionis,* and the subfamily name based on it is correctly Vipioninae which the writer used in the place referred to. But the name of the genus which is the type of the subfamily is now *Microbracon* and the subfamily should then be called the Microbraconinae.

The Braconidae tabulated here have been placed in various subfamilies but to the writer they seem to belong together. However, in default of opportunity for thorough consideration of the matter he does not wish to give them at present any common designation.

They have the following characters in common: the head is completely margined behind and there is a sinus between the clypeus and the mandibles. In all but the wingless endemic *Ecphylopsis nigra* Ashmead the parapsidal furrows are strongly impressed, there are two closed cubital cells in the front wing and in the hind wing there are two cross veins extending backward from the mediellan vein, a nervellus near the middle of the mediellan cell and a postnervellus interstitial with the basellus. All the species so far as their habits are known are parasites of beetle larvae and all of these but *Heterospilus prosopidis,* the *Bruchus* parasite, attack wood-boring beetles. The habits of the endemic *Ecphylopsis* are unknown.

TABLE OF SPECIES.

1. Wingless, a very small mountain species. 1. *Ecphylopsis nigra.*
   Winged species ---------- 2.

2. Abdomen petiolate or subpetiolate, the first tergite much longer than broad and its sides parallel---------- 3
   Abdomen not petiolate, first tergite with the sides converging in front, its posterior margin but little if at all shorter than a side ---------- 4

**Proc. U. S. Nat. Mus., 53:196, 1917.

3. Abdomen distinctly petiolate, the first tergite subcylindrical, hind femora simple, not toothed----------2. *Spathius perdebilis* Perkins

Abdomen with the first tergite flattened, but little narrower than the third, hind femora incrassate and toothed beneath.

3. *Euscelinus peregrinus* Perkins

4. First tergite about one and one half times as broad as long, abdomen oval, hind wings of male with pseudostigma.

4. *Heterospilus prosopidis* Viereck

First tergite not broader than long, abdomen more elongate, hind wings without a pseudostigma---------- 5

5. Subdiscoidal nervure continuing in the same line with the discoidal, abdomen with transverse row of crenulate sulci on tergites 3-5----------5. *Hormiopterus vagrans* n. sp.

Subdiscoidal nervure arising from the interbrachial nervure, abdomen without transverse row of crenulate sulci except on tergite three ---------- 6

6. Female and male pale testaceous, thorax and abdomen often much infuscate but the parapsidal furrows always pale, third tergite without a crenulate furrow.

6. *Ischiogonus palliatus* (Blackburn)

Female with the head pale, thorax and abdomen black, male pale testaceous, third tergite with a crenulate furrow.

7. *Ischiogonus pallidiceps* Perkins

28. A New Immigrant Hormiopterus.

Hormiopterus vagrans n. sp.

Female: Head brownish-yellow, eyes black, mandibles and antennae infuscate toward apex; thorax and abdomen dull reddish brown, propodeum and first tergite black, the other tergites more or less dark on the disk; legs pale testaceous, the tarsi a little infuscate at apex; ovipositor sheaths black apically, paler at base; wings subhyaline, iridescent, the nervures blackish, paler apically, stigma and costa except at apex pale testaceous.

Antennae about 35-jointed, about as long as the entire body, all the joints longer than broad, first flagellar joint a little longer than the second; face thinly hirsute, finely granular, with shallow indefinite punctures; eyes rounded, exceedingly slightly emarginate opposite the antennae, malar space broad; genae a little broader below; ocelli in a very small triangle, separated from each other by but little more than the diameter of one, much nearer to each other than to the eye margin; front, vertex, and occiput minutely tessellate; occiput and vertex with the hairs directed forward.

Mesonotum roughly tessellate or granular, hirsute, the parapsidal furrows converging behind and meeting at about two-thirds of the distance to the scutellum and continued to it in a broad shallow rugulose

furrow with three longitudinal carinae; sides of pronotum rugulose with a longitudinal carina near the middle reaching to the front and hind margins; mesopleura and mesosternum margined in front, a deep smooth furrow on either side separating the sternum from the pleura, the vertical furrow broad and rugose, mesopleura tessellate granulate above, smooth below and shining as is the sternum, middle line of mesosternum crenulate; prescutellar sulcus not deeply impressed, divided by about five raised longitudinal lines; propodeum with two well defined lateral areas touching in front and each bounded by a raised consute line, the rugose petiolar area therefore narrowed.

Abdomen slightly longer than head and thorax combined, widest across the fourth segment, the ovipositor about two-thirds as long; pedicel about as long as its apical width and longitudinally, coarsely rugoso-striate; second tergite short, transverse and closely fused with the third, its apical margin broadly raised and polished, its broad margin more narrowly raised and smooth, between is a transverse row of longitudinal sulci and coarse striae; third and fourth tergites each with a transverse row of crenulate sulci at the basal margin, the striae separating the sulci radiating obliquely outward especially towards the sides of the disk and gradually becoming obliterated before reaching the apical margin, which is smooth, the striae sometimes branching or more often with secondary finer striae in the interstices but these generally do not reach quite to the basal margin; fifth tergite similar to the preceding two but the striae are wholly longitudinal and parallel; second to fifth tergites moreover become rugoso-striate on the vertical sides and slightly more finely sculptured here than on the disk; sixth tergite minutely tessellate at base and finely, transversely lineolate at apex; last two tergites mostly concealed beneath the sixth and apparently wholly smooth.

Length, 3.6; wing, 2.8; ovipositor, 1.1 mm.

Male: Similar to the female, but the abdomen is much slenderer, the second tergite no shorter than the following segments; each of the first five tergites, including the pedicel, with coarse striae reaching nearly to the apex of the segments, the interstices rugose with fine cross lines; antennae with about 27 to 29 joints.

Length, 2.6; wing, 2.3 mm.

Described from 16 females, 11 males reared from larvae of *Neoclytarlus euphorbiae* from Ewa Coral Plain, Oahu, June, 1919 (Bridwell), and 12 females, 4 males collected in Honolulu, on Mt. Tantalus, and in Palolo, Niu, Wailupe, Kuliouou and Waianae Valleys, Oahu (Giffard, Swezey and Timberlake), the earliest specimen having been taken in Niu, Feb. 1, 1914 (Swezey).

Type and allotype in the collection of the Hawaiian En-

tomological Society. Paratypes in the collection of the Hawaiian Sugar Planters' Association, and in the collections of Mr. Timberlake and the author.

29. Ovipositson of Ischiogonus palliatus (Blackburn).

A lot of three females and males were bred from a larva of *Plagithmysus pulverulentus* under the bark of *Acacia koa* from Oahu brought in by Mr. Swezey. These emerged about June 15, and were fed and seen to mate and were placed with a branch of *Euphorbia* containing larvae of *Neoclytarlus* and on July 7 four males and three females had emerged. These were placed with material containing larvae of *Neoclytarlus*. A female was seen ovipositing July 8, the oviposition being similar to that of *Heterospilus prosopidis*, the ovipositor being grasped by the apical two-thirds of the sheaths, the bases of the sheaths and ovipositor being widely separated. The sheaths are strongly bent and served to brace the ovipositor while in operation. The oviposition was nearly complete when noticed and no details further were observed.

This species has been recorded by Dr. Perkins as attacking the Plagithmysine beetles in the native forests. My observations show that these attacks are responsible for a very heavy mortality among them, particularly in the case of species attacking thin-barked trees.

30. Myrmosula Bradley.

Myrmosa parvula Fox and *M. rufiventris* Blake were originally included. The former may be considered the type. Probably the group is better considered as generic.

Myrmosula rufiventris (Blake).

This species has apparently been represented in collections by the unique type in the collection of the American Entomological Society from Nevada.

It is represented in the author's collection by a single

male collected at Corvallis, Oregon, June 30, probably 1907 or 8 (J. C. Bridwell).

This has since remained in my collection unidentified, the peculiar structure of the mandibles having been undescribed. The mandibles are rather elongate and slender and bidentate at apex, the lower tooth being much longer than the upper. When the mandibles are closed, doubtless the huge median tooth is concealed. This is sub-triangular. a little recurved, acute at apex, and a little longer than its distance from the upper (or inner) apical tooth.

In *Myrmosa unicolor* the mandible is tridentate at the apex and the inner broad triangular tooth is much nearer the apex of the mandible.

31. Odynerus pseudochromus Perkins.

Occasionally this species has the angles of the propodeum reddish and a large round spot on either side of the second tergite.

The male varies also with clypeus with an encircling yellow margin as well as the red spots on the second tergite. Either of these variations may exist independent of the other.

Pseudochromus may be distinguished from *leiodemas* by the smooth lateral area on the dorsal face of the propodeum. This species employs the pupal chambers of Anobiid beetles from which the beetles have emerged as well as the pith cavities of the twigs. In either case the cavity containing the cells is closed by a mud plug at the entrance some distance away from the last cell. Two or three cells fill the Anobiid pupal chamber while I have seen nests of a dozen cells in pith cavities.

32. Two New Nearctic Species of Hypomiscophus Cockerell from the Pacific Coast.

Hypomiscophus Cockerell and *Miscophinus* Ashmead are synonymous and were published upon the same day. Prof.

Cockerell has apparently shown that his genus was published a few hours earlier and his name is accordingly used here.

Hypomiscophus aenescens n. sp.

Male: Length 4.25 mm.; wing 3 mm.

Black; face, front, and vertex, and thorax with dull bronzy reflections; mandibles rufopiceous apically, flavotestaceous basally as is the anterior margin of the clypeus; legs with the incisures and the hind tarsi obscurely testaceous; wings subhyaline, iridescent, apically infuscated; the nervures brownish except costa which is blackish. Face to front, occiput, and margins of tergites with conspicuous appressed pubescence appearing silvery in certain lights, elsewhere there generally lies conspicuous fine appressed pubescence. Clypeus with the middle lobe truncate apically, convex on the disk, not carinate; front with a feeble impressed line reaching two-thirds the distance from the antennal sockets to the anterior ocelli. Eyes convergent above; ocelli in an acute triangle, anterior ocellus larger, posterior ocelli a little nearer the eye-margin than to each other.

Pronotum about as long as the mesoscutum, its sculpture microscopically wrinkled longitudinally in front, transversely behind; the mesonotal sculpture is granulo-punctate; mesopleura similar; scutellum and metanotum similar: propodeum finely transversely striolate, the median longitudinal raised line distinct; sides of propodeum longitudinally striolate; the posterior face with a triangular fovea above, on either side of which are three or four strong short parallel transverse ridges.

Abdomen with the tergites tessellate; apices of sternites 2-6 with a few erect spines.

Hind and middle tibiae with a few black spinules; nervulus inserted nearly its length before the basal nervure.

Described from a single male with the antennae missing taken at Pamelia Lake on Mt. Jefferson, Oregon, July 16, 1917 (Bridwell). Type in author's collection.

Evidently related to *nigrescens* Rohwer, but the propodeum appears from the description to be much more strongly striolate in *aenescens* as well as the head and thorax being bronzy in *aenescens* and black in *nigrescens*.

Hypomiscophus timberlakei n. sp.

Female: Length 6.75 mm.; wing, 4 mm.

Black; scape piceous apically; tegulae black, piceous apically; mandibles obscurely flavotestaceous, rufopiceous at apex; abdomen ferruginous apically and the basal segment more blackish; tarsi dull reddish;

wings hyaline iridescent, infuscate apically; venation brownish. Face and occiput and apices of tergites with some appressed silvery pubescence, with some less conspicuous fine similar short hairs elsewhere generally.

Anterior margin of middle lobe feebly rounded out, impressed in the middle and slightly emarginate, the disk convex; front with a short, faintly impressed median line nearly midway between the antennal sockets and the anterior ocellus. Eyes rather strongly convergent above, ocelli in an acute triangle, the hind ocelli distinctly nearer the eye margin than to each other and nearer each other than to the occipital margin, three times the width of an ocellus in front of the summit of the eyes.

Front, vertex, pronotum, mesonotum, mesopleura, scutellum and metanotum appearing finely granular under a hand lens, really very closely minutely punctulate, propodeum very finely transversely obliquely striolate, the longitudinal raised line obscure, placed in a shallow groove, the sides obliquely longitudinally striolate, the posterior face with a triangular fovea above, with short transverse ridges on either side similar to those in *aenescens* but more numerous; abdomen tessellate.

Anterior tibiae with a comb composed of a few elongate setae; posterior and middle tibiae with a few spines. Sternites 2-5 with a few erect black setae on the margins.

Nervulus interstitial with the basal nervure. First joint of flagellum a little longer than second.

Described from two females collected at Idylwild, Mt. San Jacinto, California, July, 1912, the type collected by P. H. Timberlake for whom the species is named, and the other by the writer.

Type in the author's collection.

Two other species are described as having the abdomen more or less ferruginous. *H. arenarum* Cockerell is a smaller species (3 mm.), the tibiae are red and the longitudinal raised line of the propodeum is distinct. *H. texanus* (Ashmead) has the legs entirely red, the petiole of the 2nd cubital cell is described as only a third as long as the side of the cell while in *timberlakei* it is more than half as long. *Texanus* is a smaller species (3 mm.) and the propodeal raised longitudinal line is distinct, the collar is said to be brownish ferruginous and the two or three apical segments are said to be dark. These differences may be inconstant, since in the two individuals of

timberlakei before me, one has the apical segment black and the other is dark only at the apex.

33. A New Niteline Genus from South Africa.

Mutillonitela new genus.

Head transverse, oblong, the eyes elongate, convergent above occupying the entire side of the head from the vertex to the base of the mandible. Mandibles edentate, strongly notched before the middle. Clypeus transverse, broadly expanded in front, entire along the whole margin, with about six strong flattened blunt parallel spines beneath the margin in the middle. Antennae inserted just above the clypeus, the sockets in a line with the anterior margin of the eyes, scape stout and excavated at apex. Ocelli in an obtuse triangle, the hind ocelli in front of the summit of the eyes. A deep fovea between the ocelli and eye margin, wings somewhat abbreviated with completely closed costal, median, submedian, one cubital, one discoidal, and brachial cell. Radial cell very short, variably open at apex or closed, barely extending beyond the apex of the short first cubital cell, nervulus inserted before the basal, nervellus far before the margin of the radiellus.

Hind and middle tibiae spinose, the anterior tibiae of female with a well developed tarsal comb.

Abdomen of female without a defined pygidial area.

Head and thorax clothed with two kinds of pubescence, peculiar erect setae and the ordinary fine pubescence. Wings strongly pubescent, subhyaline to beyond the venation then strongly infuscate.

Related to *Saliostethus* and *Miscophoides* of Brauns but differs by the venation.

Type: *Mutillonitela mimica* Bridwell.

Mutillonitela mimica n. sp.

Female: Length 5 mm.; wing 3 mm. more or less.

Black; legs, venter of abdomen and apical tergite dull ferruginous, the abdominal color darker; posterior margin of scutellum, mentanotum and outer half of wing base whitish; anterior calcar pale; middle (1) and hind (2) calcaria black; mandibles yellowish ferruginous at base, piceous apically; antennae brownish; venation of wing yellowish.

Face, front, vertex, pronotum and mesonotum with stout erect yellowish setae, mingled on the head and thorax above with finer silvery pile; coarse silvery hairs on mesopleura, propodeum, epipleura of tergite one, sternite two on the sides and margins of tergites and sternites.

Head, pronotum, mesonotum, scutellum, mesopleura and metanotum opaque and granular.

Collar about twice as broad as long, rounded down to the declivity; propodeum without a well defined basal area, the superior face with a

feeble longitudinal raised line in a shallow ill defined furrow, surface coarsely tessellate, with feeble radiating striolae basally and transverse ones apically, sides of propodeum obliquely striolate, posterior face narrow, with a shallow furrow and impressed line above, transversely strongly striolate throughout; middle and hind tibiae with stout white spines on the outer face as long as the width of the tibiae; front tarsi grooved beneath, the comb strongly developed; hind and middle tarsi strongly spinose.

Abdomen with the tergites not contracted at the sutures, very finely strongly punctate, the punctures separated by about two or three times their diameter.

Described from two females collected at the Mowbray Golf Links, Rappenberg, near Capetown, Feb., 1915 (Bridwell). Type in the South African Museum, paratype in the author's collection.

Mutillonitela lounsburyi n. sp.

Female: Similar to *mimica*. Length 5 mm..; wing 3 mm.

Clypeus pale, ferruginous, legs brownish piceous; scutellum and metanotum black; tergites 1-3 rufescent; apical two-thirds of tergite 6 whitish yellow; sternites 2-6 dark; pubescence of head much feebler and sparser; the setae reduced to pointed hairs.

Pronotum longer, punctate, the surface between more transversely rugulose; mesonotum similar; scutellum with the punctures very distinct, well separated; mesopleura shining, the punctures irregularly disposed; propodeum similar to that of *mimica* but the surface more rugose; sides of propodeum shining with strong, well separated punctures, the posterior face like that of *mimica*.

Abdomen shorter, more compact, first tergite broader, the punctures larger, stronger, and more separated.

Described from one female collected in the same locality as *mimica* Feb.-April, 1915 (Bridwell).

Type in the author's collection.

Both species were taken running along the bare sand and resemble closely the small *Mutillidae* which are found there, until disturbed when they escape by flying. I am disposed to consider this a real case of mimicry. A Nyssonid not yet studied was found under the same circumstances and even more closely resembling the *Mutillidae*.

Named in compliment to C. P. Lounsbury, the head of

the entomological service of South Africa, who extended me many courtesies during my stay in South Africa.

34. A New Silaon from the Hawaiian Islands with Descriptions of two others from California.

Silaon rohweri n. sp.

Female: Length 4.5 mm.; wing 3.5 mm.

Black; mandibles piceous at apex; transverse spots on either side of collar, apex of tubercles, small spots on tegulae, small spot on either side of metanotum, oval spot posteriorly at apex of front and middle tibiae, interrupted stripe on dorsal surface of hind tibiae not attaining base or apex, and calcaria yellowish-white; wings dusky subhyaline, strongly iridescent, venation dark brown.

Body with fine silvery pile covering the surface on the sides of the clypeus and sides of face.

Mandibles simple, clypeus produced in the middle and rounded with a rounded median longitudinal ridge continued as a fine carina to about the middle of the eyes, disappearing at the protuberance of the front; front vaguely and indefinitely impressed longitudinally in front of the anterior ocellus; eyes somewhat convergent above; ocelli in an obtuse triangle, the posterior ones in front of a line connecting the summit of the eyes, nearer to the eye margin than to each other; process and median ridge of clypeus smooth and shining, a few coarse punctures

Siloan rohweri.

on the edge of the pubescence which conceals the sides; front and vertex strongly confluently punctured, the genae and occiput more finely so.

Collar not margined or carinate anteriorly; mesonotum, scutellum, and mesopleura closely and subconfluently punctate; basal margin of

propodeum consute; superior face with irregular transverse well separated fine rugae; the surface between tessellate; with an imperfectly defined triangular basal area extending over on the declivity; posterior face transversely rugose or striate divided by the longitudinal sulcus; sides of propodeum finely longitudinally striate.

Tergites very finely but strongly punctate the interspaces, two or three times as wide as a puncture; first, second, and third tergites with margins depressed, more narrowly laterally; the depression of second and third is not quite one-third the length of the tergite. Sternite shining, more coarsely punctured, the margins testaceous.

Nervulus nearly interstitial, first recurrent received by the first cubital cell.

Male; Similar to female but the hind tarsi with the first and second joints pale.

The clypeus produced into a narrowly rounded tooth. The last joint of antennae longer than broad about as long as the three preceding joints. Next to last and preceding joint shorter above than below. Basal area of propodeum more definitely finely rugostriate, the striae radiating from the central furrow. Seventh sternite entirely concealed, eighth produced in the middle into a broad, flat truncate process a little longer than broad and about 1-3 the width of the sclerite.

Described from a single female specimen secured by sweeping at Waianae village, Oahu, at sea level, May 23, 1919 (Bridwell), and a male from Ewa Coral Plain bred from a cocoon in the borings of *Neoclytarlus euphorbiae*.

It is not absolutely certain that this is an immigrant species, since several endemic Hymenoptera occur in the locality where it was found. It is, however, probable that it is introduced through commerce, possibly from Central America or Mexico.

Named in honor of Mr. S. A. Rohwer, who has described a majority of the North American species.

Some dead *Euphorbia* wood containing the borings of *Neoclytarlus euphorbiae* Bridwell was taken at Sisal on the Ewa Coral Plain on August 31, 1919. The examination of two pieces of the main stem of a bush, probably from the same bush, revealed four cells constructed by this wasp. Each cell occupied the pupal chamber of the *Neoclytarlus* and the opening through which the adult beetle had emerged was plugged up with bits of coral, mud and vegetable debris, in one in-

stance some small dried leaves of the *Euphorbia* were used, in another the glumes of a grass. Apparently the mud is placed without much order within the chamber and there is no definite cell wall surrounding the prey and larva of the *Silaon*.

In two of the cells the larva had died and the dried up prey remained. This consisted of the nymphs of the Lygaeid bug, *Nysius*, belonging to an undetermined species. One contained 12 nymphs and a small dried up larva of the *Silaon*. But one of the nymphs had been fed upon. The other contained a larger dried up larva and four nymphs, two of which had been fed upon somewhat.

The other two cells contained a cocoon of the *Silaon*. These cocoons are nearly elliptical in outline with one end a little larger than the other. The cocoon is earthy, commingled with a little silk and sand grains. They are about 2 mm. thick by 5 mm. long.

The nesting place is similar to that described by Xambeau for *S. xambeaui* André and the cocoon resembles that of that species. *S. compeditus* of Europe was found by Ferton burrowing in the ground and making a series of cells containing nymphs of Lygaeid, while Williams found *Silaon inerme* (Cresson) in Kansas storing Capsid (Mirid) nymphs in a hole in the ground apparently in a spider's burrow.

Since the description above was written Dr. F. X. Williams has taken additional material from the Ewa Coral Plain and observed the habits of the species in the field. I am greatly obliged to him for the opportunity to include this material in the type series: 6 females, 9 males taken at Sisal, March and April, 1920.

Type and allotype in the collection of the Hawaiian Entomological Society. Paratypes in the collection of the Hawaiian Sugar Planters' Association, and in the private collections of Dr. Williams and the author.

Through the kindness of Dr. Williams I am permitted to use the accompanying figure of the female which is his work.

Silaon blaisdelli n. sp.

Female: Length 3.5 mm.; wing 2.5 mm.

Nervulus interstitial with the basal nervure, first recurrent nervure received by the first cubital cell.

Black; mandibles more or less piceous at apex; interrupted line on collar, tubercles, spot on tubercles, tegulae, spot on apex of front and middle tibiae behind, stripe on tibiae outwardly, calcaria, and stripe on metanotum yellowish-white; margins of tergites and sternites pale testaceous. Body with appressed silvery pubescence, more conspicuous on sides of face, and on the margins of the tergites laterally Clypeus shining not carinate, produced into a short rounded process in the middle, front below with a tectiform ridge; gibbosity of front not impressed; eyes but little divergent below; ocelli in an obtuse triangle; the posterior ocelli in front of the summit of the eyes, about one half as far from the eye margin as from each other.

Face, front, vertex, occiput, collar, mesoscutum, scutellum and metanotum finely, closely and distinctly punctate, the metanotum more finely so; mesopleura with the surface sculpture similar in general but somewhat concealed by the pubescence, above the impressed pit on the mesepimeron is an ill-defined, glabrous shining spot with the surface microscopically tessellate. Propodeum with the basal area well defined by a U-shaped raised line, basally are some weak radiating striae not one-fourth the length of the area, apically the rugosity of the surface is transverse; sides of propodeum finely longitudinally striolate; fovea of posterior face shallow, the parallel transverse ridges feeble but numerous and reaching well toward the sides.

Wings subhyaline, iridescent, the venation brownish. The petiole of the second cubital cell short, not more than a fourth the length of the sides of the cell, the cell triangular.

Abdomen shining, finely, discretely punctate.

Described from a single female collected at San Diego, California, March 29, 1891 (Dr. F. E. Blaisdell). Type in the author's collection.

Similar to *rohweri*. From *rohweri* it differs by the well-defined propodeal area and longer propodeum. The basal area is V-shaped in *rohweri*. *Parvus* (of which the female is undescribed) is described as having the radial cell not appendiculate while it is distinctly so in *blaisdelli*. The basal area of the propodeum of *parvus* is described as triangular while it is distinctly rounded behind in *blaisdelli*. Otherwise from the description the species are very near each other.

Silaon similis n. sp.

Length: 6.5 mm.; wing 4 mm.

Nervulus inserted distinctly beyond the basal (about the width of the vein), first cubital cell receiving both recurrents.

Black; transverse spot on either side of collar, tubercles, narrow apical line at apex of trochanters behind and spot on the middle of hind tibiae behind yellowish-white; calcaria whitish; mandibles piceous at apex; tegulae, tarsi, and margins of abdominal segments brownish; wings subhyaline, nervures yellowish except costa and stigma, blackish.

Appressed silvery pubescence very conspicuous on clypeus and face, less so on cheeks, collar, mesopleura, sides of propodeum and base and apex of tergites (interrupted medially), continued along the sides of the abdomen. Middle tibiae with a few whitish spinules, sternites 2-5 with the usual erect whitish setae on the margins.

Clypeus strongly carinate, the apical margin of the middle lobe thickened and shining, subtruncate, a little rounded out; eyes strongly convergent above; carina extending from the clypeus over the front, not strong, connecting a little above the antennal sockets with an impressed line which deepens into a shining fovea on the middle of the front and is continued faintly to the anterior ocellus. Front rather strongly, coarsely and closely punctured, becoming striate in the depression in front of the large front ocellus, vertex longitudinally striate between the ocelli, smooth and shining obliquely in front of the hind ocelli with a few fine punctures on the orbits there; the head behind the ocelli and the occiput transversely striatopunctate; ocelli in an equilateral triangle, the hind ocelli a little nearer the eye-margin than to each other and further than this from the occipital margin.

Pronotum very short, a little notched in the middle, abruptly declivous in a plane in front but not carinate. Mesonotum closely, coarsely subconfluently punctured, the parapsidal and median lines indicated but not impressed; mesopleura without an impressed pit, more discretely punctured on its disk; scutellum strongly discretely punctured more sparsely on the disk; metanotum very finely and closely punctured; propodeum with the basal area ill-defined, bare, opaque, with a few radiating wrinkles more distinct at base and an imperfect raised line, the general surface subreticulate, with smooth shallow punctures in the interspaces; the basolateral areas with the surface concealed by pubescence; sides of propodeum glabrous shining, obliquely striolate, posterior face transversely striate, the fovea rather shallow.

Abdomen shining, the first tergite strongly finely rather deeply punctate, the others more finely and less distinctly so; sternites similar.

Closely related to *S. plenoculoides* (Fox) but the middle tibiae have some spinules, and the details of the head and propodeal sculpture seem different. Rohwer describes the pro-

notum of *plenoculoides* as carinate, which certainly does not apply to the present species.

Described from a single female collected at Berkeley, California, May 12, 1912 (Bridwell). Type in author's collection.

Notes on the Bruchidae (Coleoptera) and their Parasites in the Hawaiian Islands, 3rd Paper.

BY JOHN COLBURN BRIDWELL.

Bruchus prosopis Leconte.

This species has been increasingly numerous and destructive in its attacks upon the seeds of *Prosopis juliflora*. This condition led to the problem being taken up by the Union Feed Co. of Honolulu, who made possible the continuance of investigation on the weevil injury to the algaroba beans. An economic report upon these injuries was submitted to Mr. F. W. Mcfarlane, the president of this company, on December 24, 1919, and this is soon to be printed in a slightly altered form in the Hawaiian Sugar Planters' Record. On Feb. 1, 1920, these investigation were taken up by the Bureau of Entomology of the U. S. Department of Agriculture, and these notes are designed to bring up my records regarding the Bruchids to that date.

The attack by this species upon the young pods begins soon after they are set, when the seed is very small and the whole pod is only about one-eighth of an inch in thickness. The eggs are laid singly or in small masses of two or three, or perhaps more, cemented lightly to the pod.

The puncture made by the hatching larva results in a copious exudation of gum which is at first clear but later becomes brownish. This seals the entrance hole and often dislodges the egg mass so that the other larvae are unable to enter the pod.

The eggs of this species being usually laid at a time

when the pod is very young and in a formative condition, the larva on entering sets up a considerable disturbance in the developing tissue, some of it probably caused by the entrance of bacteria. If the eggs are laid on the edge where the young saclike developing seed is attached, this injury very frequently prevents further growth of the embryo seed, and thus a considerable loss of beans is caused in which the young larvae have not fed. The pod is also frequently deformed as the result of these attacks.

The young larva, instead of entering the developing seed at once, feeds for some time in the gummy or syrupy layer between the inner and outer fibrous layers of the pod. It is not until the young seed has reached practically its full dimensions and when its cotyledons are firm in texture that the larva enters at one edge and makes its way to near the center of the seed. Here it feeds rapidly and attains full growth and pupates after destroying the entire embryo before the pod has reached its full thickness and before the pulpy and syrupy layer has attained its full thickness.

The young pod is at this time about three-sixteenths of an inch or less in thickness, against the five-sixteenths of an inch attained at full maturity, and the pod is much easier of penetration by the ovipositor of the parasites than later when the fibrous layers have become hard and woody. It is at this time the attacks of *Heterospilus prosopidis* Viereck upon the *Bruchus* larvae usually take place.

The destruction of the very young beans and the eating of the green beans in a later stage of their development constitute the greater part of the injury done by this *Bruchus*.

The adult weevils can, as has been previously recorded, oviposit in crevices in the ripe pod, very often in the holes from which the weevils have emerged, and the larvae enter into the ripe seed and devour its contents. It seems probable that this reinfestation is likely to be more extensive when the pods are so damp as to give considerable fluidity to the syrupy contents of the pulp and to soften the seed coats.

While the observations have not been carried out to enable us to state with exactness the time required for the development of *Bruchus prosopis* in the green pods, the indications are that the period is about four to six weeks from oviposition to the emergence of the adult upon the pod. In any case the emergence from the pod takes place soon after the ripe pod falls to the ground or even before, some even while the pod is still green. In any case all the injury from the initial attack is completed by the beginning of storage while much of the emergence is completed soon after.

In contrast to this short period for development, the only record of timed breeding from ripe pods yet secured gives a period of 130 days for development during the cooler months of the year here.

Bruchus sallaei Sharp.

This species has now spread from the originally discovered center of infestation upon Punchbowl crater to both extremities of the island of Oahu at Kaena and Makapuu Points.

Observations previously made indicated that this species could breed at the expense of the seeds of *Prosopis juliflora*. In November, 1919, examination of weevils bred by Mr. Pemberton from pods of algaroba gathered at Waikiki showed that 23% belonged to this species and more recent breedings show that this species frequently outnumbers *B. prosopis* in the pods of *Prosopis*.

It is exceedingly curious that the eggs of this species now seem to be much more frequently laid in compact masses of 2-7, or more eggs, than previously observed. In 1918, only an indication of this was observed but now the prevailing method of oviposition upon the pods is in masses. The eggs laid upon the seeds of *Acacia farnesiana* within the pods seem to be always laid scattered. Ordinarily the eggs of this species are not laid upon the green pods of *Acacia farnesiana*, but Mr. Swezey has shown me a few laid upon green but

mostly well-grown pods. On the other hand the eggs seem to be laid upon the pods of *Prosopis* in all stages of growth from the newly set pods to those fully ripe. It does not show the aversion to laying its egg masses upon exposed surfaces which is so characteristic of *B. prosopis* when laying upon the ripe pods.

The eggs from this species when laid in masses are not readily distinguishable from those of *B. prosopis,* though the latter seem to be somewhat smaller and more slender.

There is every indication that in this species, which until last year was not known to attack the seeds of *Prosopis,* we have an enemy of first importance more adaptable and perhaps more serious than either of the other species attacking this crop in the Hawaiian Islands.

Bruchus limbatus (Horn).

In June, 1919, Mr. Swezey and Mr. Pemberton found at Waipio, Oahu, a seed of the monkey-pod *(Samanea saman)* bearing eggs of a Bruchid. After bringing this into the laboratory, four adults emerged from the seed. Examination of these led to their determination by the writer as *Bruchus limbatus* Horn, an inhabitant of the arid Southwest, Texas, Arizona, South California and Mexico.

Subsequently the species has been found rather generally distributed in Honolulu and as far along the Kamehameha highway as Castner. It has not yet been found upon the windward side of Oahu.

Besides *Samanea saman,* this species has been found here breeding naturally in the seeds of *Pithecolobium dulce* and *Albizzia lebbek,* while it has been bred experimentally from the seeds of *Acacia farnesiana* and from the pods of *Prosopis juliflora.* In the latter case the breeding was secured only after repeated experiment and then only a few adults emerged. It is interesting to note that most of the trees upon which it has been found breeding in the open here are natives of its home country, or at least of the American continent. They

are all plants of considerable importance in tropical agriculture and forestry.

It is uncertain how long the species has been established in the islands but certainly its general spread over this island has occurred since 1917, since the trees of *Pithecolobium* under which extensive collections of seeds were made at that time without finding this weevil, have the fallen seeds infested now.

Cushman has recorded this species (Jour. Econ. Ent. 4:498, 1911) as bred from an unknown leguminous chapparal at Brownsville, Texas, called "tenaza" by the Mexicans, and from *Siderocarpus flexicaulis.* Amundsen reported this species from an undertermined Mexican legume presumably growing at San Diego, California, called Guamuchile by the Mexicans. This plant, judging from his figure of the pod and seed, is *Pithecolobium unguiscatae* or some allied species.

On Dec. 26, 1919, this weevil was found at work on the fallen pods of *Samanea saman* on the government road not far from Pearl City. Eggs had been laid in great numbers on the under side of the old pods as they lay on the ground and many others on the seeds as they had been exposed by the weathering of the pods. Those eggs so concealed had been but little parasitized by *Uscana,* though a few parasitized eggs were seen.

Examination of the pods showed them to be in general without syrupy contents. They were also somewhat attacked by *Pyroderces rileyi,* and one or two other moths, by *Araecerus fasiculatus* and one of the species of *Carpophilus.*

A well-grown pod at maturity is about 6-8 inches long, not quite an inch wide and a half inch thick and contains 18-22 or more seeds, each in a separate chamber formed by the firm, rather woody layer of the pod, with layers of the two halves touching each other between the seeds. There is a cellular syrupy layer between the inner layer and the firm cuticle. Each edge of the pod is thickened and the pods do not dehisce. The seeds are 3/8 in. (9 mm.) long, nearly

5/16 in. (7 mm.) wide and 9/32 (5.5 mm.) thick, shaped like a grain of corn as seen flat and thicker before the middle. There is no apparent albumen and the seed coat is thickest at the edge. The emergence holes of the weevils are therefore generally found along the edge of the seed.

From 69 seeds examined from a lot in which the weevils had been breeding for three generations 193 weevils had bred as follows:

From	13	seeds	containing	1	exit	hole	 13
"	20	"	"	2	"	holes	 40
"	20	"	"	3	"	"	 60
"	8	"	"	4	"	"	 32
"	3	"	"	5	"	"	 15
"	3	"	"	6	"	"	 18
"	1	"	"	7	"	"	 7

In the "Table of Hawaiian Bruchidae" (these Proceedings 3:466, 1918) this species would run to 8 and differs from *Bruchus pruininus* by the red markings of the elytra.

Caryoborus gonagra (Fabricius).

While the eggs of *Bruchus prosopis* are laid early enough in the development of the algaroba pods that the principal damage is completed before the crop is harvested, this species oviposits usually upon the ripe pods and the main feeding is done in stored beans.

Uscana Semifumipennis Laying in Eggs of Bruchus Sallaei.

On November 25, newly emerged *Bruchus sallaei* females were placed with a pod of *Acacia farnesiana* and left until about 10 a. m., November 27, when many eggs had been laid scattered on one surface. This pod was then placed in a test tube with newly emerged *Uscana* from eggs of *Caryoborus*. By 12 m. the females were seen ovipositing and mating was in progress.

From the effects of the parasitization all but one of the eggs were later found to be parasitized.

Later observations indicate that the attacks of this species are confined to the recently laid (unincubated) eggs of its hosts.

The parasitization records of this species now include *Bruchus prosopis* and *Bruchus limbatus*.

I have observed eggs of *Bruchus sallaei* and *Bruchus prosopis* concealed within pods parasitized by this species.

Descriptions of New Genera and Species of Hawaiian Encyrtidae (Hymenoptera), II.

BY P. H. TIMBERLAKE.

ECTROMATINI.

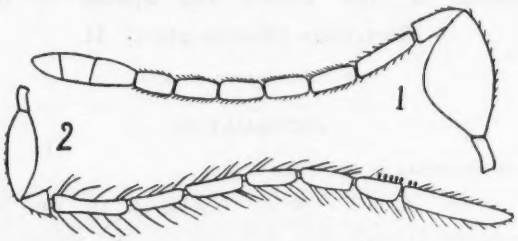
Anagyrus antoninae n. sp. Figs. 1, 2.

A rather slender species belonging in the subgenus *Epidinocarsis* Girault but differing in the opaquely alutaceous sculpture and abundant white pubescence of the mesonotum.

Female: Head thinly subhemispherical, a little broader than long, thickest just above the anterior corners of the eyes; as seen from the side the curvature somewhat more abrupt next to the mouth and more gradual towards the occipital margin; as seen from in front the cheeks converge slightly towards the rather wide mouth. Occiput moderately concave with the margin rather acute above; frontovertex about one fourth longer again than its width at the ocelli, noticeably but not greatly widening anteriorly; ocelli placed in a right-angled triangle, the posterior pair about twice their own diameter from the eye-margins and three times their diameter from the occipital margin; eyes rather broadly oval, more bluntly rounded at the anterior end, strongly convex and slightly protuberant, just touching the occipital margin posteriorly, the outer margins nearly straight; face very slightly inflexed at a point opposite the lower third of the eyes, the scrobes rather deep, slightly converging but not meeting above, the facial prominence between the antennae somewhat arched below and visible in side view of head, the oral margin prominently emarginate at the middle, with the sinus rounded; cheeks short or about equal to two-thirds of the

eye width. Antennae inserted rather near together, close to the oral margin but nevertheless slightly more than half way to a line connecting the anterior corners of the eyes, the upper end of the sockets touching this line; scape very broadly expanded beneath and excluding the radicle over one half as wide as long; pedicel slender and elongate, about equal to the second funicle joint; flagellum slender, cylindrical, slightly thicker distad; first funicle joint about four times longer than thick, the following joints gradually shortening, the last two joints equal and about twice as long as thick; club after collapsing, slightly wider than the funicle and nearly as long as the three preceding joints combined, rather acutely pionted at apex, its first joint longest, the middle one shortest.

Thorax moderately robust, rather wide and strongly depressed;



Figs. 1 and 2, *Anagyrus antoninae*, female and male antennae respectively.

pronotum strongly arcuate; mesoscutum nearly twice as wide as its median length, its posterior margin straight except for a rounded median projection which overlaps the inner ends of the axillae; scutellum large, somewhat longer than wide and rather acute at apex. Abdomen about a fourth longer than the head and thorax combined, very narrowly triangular as seen from above, strongly compressed with the dorsum deeply sunken in after death; ovipositor shortly protruded, its sheaths compressed, broader towards the base and tapering towards the apex.

Wings reaching slightly beyond apex of abdomen, rather narrow; marginal vein about thrice as long as thick, nearly equal to the stigmal, the latter straight, slightly enlarged at apex with a short stout spur, postmarginal vein short and spurlike; discal ciliation moderately dense, nearly uniform to the base of the wing, the speculum broad, extending obliquely a little more than half way across the disk from the stigmal vein and with a very small cut-off portion below widely separated from the main part.

Head rather smooth and somewhat shiny, with extremely minute granular reticulations, the frons with rather numerous minute pinpunctures; mesonotum opaquely alutaceous; metanotum, propodeum, pleura and abdomen somewhat shiny, the pleura being very finely and

delicately reticulate, the abdomen more distinctly reticulate with the lines on the first tergite arranged more or less concentrically, more distinctly so towards the middle of the segment, the middle tergites smooth and polished, the last tergite more coarsely reticulate with longitudinal lines and appearing somewhat rugulose.

Eyes with a very fine, sparse pile; cheeks, lower part of face, anterior orbits of eyes, and the frons with moderately abundant whitish pubescence; oral margin with a fringe of much longer white hairs; mesoscutum, axillae and scutellum with a moderately dense, appressed white pubescence of short flattened hairs, the scutellum with a pair of rather long, black bristles at apex and a pair of shorter bristles placed just in front of the apical pair and more towards the sides; metapleura, first tergite and sides of abdomen with a few scattered, very fine, whitish hairs.

Length: (1.00 to) 1.87; width of vertex: 0.219; width of mesoscutum: 0.52; length of fore-wing: 1.37; width of fore-wing: 0.523 mm.

Head black, the mandibles reddish brown; scape shining black with a broad, transparent white band just before the apex, base of pedicel black, the apical two-thirds white, funicle blackish gradually becoming paler distad so that more or less of the sixth and sometimes part of the fifth joint becomes yellowish white like the club. Mesonotum dull ochraceous orange (R.), the anterior margin of the scutum blackish, or more rarely and apparently only in small specimens the whole scutum except laterally and the central part of the scutellum may be suffused with black; posterior margin of the propleura, anterior part of the mesopleura and the mesosternum nearly concolorous with mesoscutum; rest of the propleura and pronotum black; most of the mesopleura, the metanotum, propodeum and abdomen blackish, the metapleura and sometimes the base of the venter brown; prepectal plates and tegulae whitish. Legs maize yellow (R.), the coxae more whitish, the tarsi deeper yellow with apex of the last joint blackish. Wings hyaline, the veins yellowish brown.

Male: Head much thinner fronto-occipitally than in the female, the curvature nearly uniform from oral to occipital margin, as seen from in front somewhat broader in proportion to the length, being widest above the middle of the eyes; the latter more protuberant and considerably smaller; frontovertex plainly wider than long, the ocelli in a slightly obtuse-angled triangle, the posterior pair about as far removed from either the eye or occipital margin as one half their distance apart; face and cheeks considerably longer than in the female, the scrobes in the form of rather short parallel furrows extending upward to the middle of the eyes and separated by the facial prominence, which is not arched and smaller than in the female so that it is hardly visible in side view of head. Antennae inserted close together just below the line connecting the lower corners of the eyes and far removed from the oral margin; scape somewhat shorter than in the female, compressed but much less expanded beneath, being narrowly oval or about one

third as wide as long excluding the radicle; pedicel short or hardly longer than its apical thickness; flagellum slender, cylindrical, clothed with long hairs more or less distinctly verticillate, each funicle joint angularly incised at apex; first funicle joint about five times as long as thick, the following joints gradually shortening, the sixth being somewhat more than one half as long as the first; first joint with five whorls of hairs, the following joints with three whorls, the hairs on the under surface excepting on most of the first joint one half shorter and semi-decumbent; club long, slender, very pointed at apex, as long as the last two funicle joints and one-half of the fourth joint, provided with about seven whorls of hairs which become gradually shorter and more crowded towards the apex; under side of the sixth funicle joint with a row of five to seven short, erect, clavate hairs, the base of club with two more in alignment.

Thorax as in the female; abdomen much smaller, or about four-fifths as long as the thorax, being ovate, depressed, broadest just beyond the cordate base and truncate at apex. Wings somewhat shorter and proportionately much wider than in the female, the disk much less densely ciliated; the speculum broad, extending from the stigmal vein obliquely towards the opposite margin, briefly interrupted below the middle, the cut-off portion being large and distinct; marginal vein much shorter or about equal to one-half the stigmal, the postmarginal better developed or as long as the marginal.

Face, mesoscutum and axillae very minutely reticulate and moderately shiny, the frontovertex more opaque and microscopically, transversely lineolate with a few scattered minute punctures; scutellum granular reticulate and opaque but becoming smooth and shining on the lateral and posterior margins, pleura and abdomen a little more shiny and more coarsely reticulate than the mesoscutum, the lines on the first tergite concentrically arranged as in the female. Pubescence about as abundant as in the female but much less conspicuous, being whitish only on the face and cheeks and less distinctly whitish on the sides of the mesoscutum, the hairs on the mesonotum being longer and not flattened; eyes more densely pubescent.

Length: (0.61 to) 1.16; width of vertex: 0.252; width of mesoscutum: 0.426; length of wing: 1.11; width of fore-wing: 0.502 mm.

Coloration black, moderately shining, the frontovertex and scutellum more or less opaque; mandibles brown; posterior margin of the propleura and the prepectal plates translucent yellowish; antennae black with the apex of the pedicel obscurely yellowish; legs maize yellow (R.), the hind coxae somewhat dusky at base; wings hyaline, the veins pale brownish.

Described from 94 females, 50 males (type, allotype and paratypes) reared from *Antonina indica* Green on Bermuda grass, Punahou district, Honolulu, Oahu, May 26 to July,

1919, and 1 male (paratype) reared from the same host, Kaimuki, Oahu, Feb. 2, 1919 (Timberlake). This is undoubtedly an immigrant species, and was presumably introduced with the host years ago from some part of the Orient. It belongs to what appears to be a distinctly Oriental and Australian group of *Anagyrus*.

Xanthoencyrtus Ashmead.

Xanthoencyrtus Ashmead, Canad. Entom. vol. 34, p. 302, 1902.

Scelioencyrtus Girault, Mem. Queensland Museum, Vol 4, p. 161, 1915.

Mirastymachus Girault, Journ. N. Y. Entom. Soc., vol. 23, p. 166, 1915.

Before the descriptions of the four new species of *Xanthoencyrtus* published in Part I of this paper* had appeared in print, three more were discovered on Oahu and Maui mainly through the efforts of Mr. Bridwell. It is becoming evident, therefore, that probably only a small beginning has been made in elucidating our Hawaiian species, as there is no apparent reason why each island of the group should not be represented by one or more species. Up to the present time they have found only on Laysan, Oahu and Maui, although the introduced species, *fullawayi*, occurs on Hawaii.

Our endemic species have been found chiefly if not entirely in the tussocks of *Eragrostis variabilis*, a coarse grass which grows in great profusion on the steep sides of the barren foothills, and less luxuriantly in similar rocky places within the native forests, as well as in regions at lower elevations that have much less rainfall. This grass is often infested with a species of mealybug, *Trionymus insularis* Ehrhorn, which serves as the host to these little parasites. Although *apterus* is the only species that has been actually reared, there seems to be no doubt that the others also parasitize this same mealybug

*Proc. Haw. Entom. Soc., vol. 4, No. 1, pp. 201-206, July, 1919.

with the possible exception of *laysanensis* and *semiflavus,* of whose habits we know the least at present. Not only do the different species have the same host but more remarkable still is the fact that two of these closely allied species have been found together, *semiluteus* and *bridwelli* thus occurring within a few rods of each other on the south wall of Palolo Valley. The effect of isolation, however, is shown in these species to a fine degree.

The introduced species, *fullawayi,* belongs to *Xanthoencyrtus, sensu stricto,* whereas *apterus* and allies fall in the subgenus, *Mirastymachus* Girault, which differs chiefly in having three club joints instead of two. With only a few species of the two groups known outside of Hawaii (there being one European, two American and three Australian species described) the value of this character is not fully established, although it may be found necessary to recognize *Mirastymachus* as a good genus later. The main distinguishing character, moreover, obtains only in the female sex.

The following descriptions have been made comparative only, on account of the close similarity of the species to *apterus,* to the full description of which reference should be made*. The depression on the dorsal surface of the head between the eyes noted in the previous paper proves to be due to shrinkage, as this space is slightly convex in living or fresh material. Since the head in each species shrinks a little differently from other species and somewhat uniformly this character may have some value, although it is by no means absolute. Occasionally a specimen of large size will be found which remains unshrunken as is the case in the type of *semiflavus* and in one specimen of *apterus* from Kahihi, Oahu.

The following synoptic tables to the endemic species have been prepared to show their relationship to each other and to facilitate their identification.

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*Proc. Haw. Entom. Soc., vol. 4, No. 1, p. 201

FEMALES.

1. Abdomen piceous or black----------2

Abdomen orange-yellow or reddish.

Head, thorax and abdomen reddish orange, the under side of thorax and the legs paler yellow, antennae at base nearly concolorous with head but passing into piceous on the third or fourth funicle joint; head and body opaquely alutaceous; the pubescence whitish and comparatively conspicuous----------*sanguineus* n. sp.

Head and thorax pale yellow, the abdomen reddish orange, legs pale yellowish white, antennae at base concolorous with head, the funicle dusky and passing into blackish on the club; head and body very finely reticulate and somewhat shiny; the pubescence very fine and sparse and not easily seen----------*semiluteus* n. sp.

2. Head but slightly or not at all wider than long, the space between the eyes from antennal sockets to occipital margin about one-fifth longer than wide----------3

Head distinctly wider than long, the space between the eyes only one-tenth longer than wide (appearing to the eye a little wider than long.

Head and thorax ochraceous orange, antennae and legs concolorous, the club and abdomen piceous; head and body smooth and shiny, without reticulations; the pubescence dusky and rather sparse. *semiflavus* Timb.

3. Legs entirely yellowish or ochraceous, the funicle piceous or black with the first joint only sometimes yellowish----------4

Hind femora piceous, the funicle entirely ochraceous.

Head, antennae except club, thorax and legs except hind femora ochraceous orange, club and abdomen piceous or black; head and body smooth and strongly shiny; the pubescence very sparse and not easily detected; head slightly broader than long.*bridwelli* n. sp.

4. Head circular in outline, the ocelli absent.

Head, thorax, basal tergite of abdomen, legs, scape and pedicel ochraceous orange, the remainder of antennae and abdomen piceous or black; head and body smooth, without reticulations and strongly shiny; pubescence sparse and inconspicuous----*laysanensis* Timb.

Head slightly wider than long, and somewhat truncate at oral and occipital margins, the ocelli present.

Head, thorax and more or less of basal tergite of abdomen ochraceous orange, the scape and pedicel concolorous, the under side of thorax and the legs a little paler, abdomen and flagellum piceous or blackish, the first funicle joint paler or even yellowish; head and body smooth and very shiny, the mesoscutum and sometimes the head with fine reticulations; pubescence dark colored and rather sparse----------*apterus* Timb.

MALES.

1. Abdomen piceous or black----------4
   Abdomen orange-yellow or reddish----------2
2. Body more or less smooth and shiny with fine reticulations; pubescence pale, sparse and not at all conspicuous----------3
   Head and body opaquely alutaceous; pubescence whitish and comparatively prominent.
   Head and thorax flame scarlet, the abdomen slightly redder, the underparts of thorax and the legs paler and yellower, scape and pedicel concolorous with head, the funicle and club piceous; sixth funicle joint and base of club with a row of about eight or nine clavate hairs----------*sanguineus* n. sp.
3. Head finely shagreened and nearly opaque, thorax and abdomen smooth and moderately shiny, the mesoscutum very finely reticulate, the basal tergite of abdomen somewhat more coarsely reticulate; coloration nearly uniformly capucine yellow, the legs paler yellow, the funicle and club black; sixth funicle joint and base of club with a row of about seven clavate hairs----------*semiluteus* n. sp.
   Head and thorax finely reticulate and shiny, the basal tergite of abdomen somewhat more coarsely reticulate; coloration about orange rufous to flame scarlet with the abdomen redder, the legs paler and more yellowish, with the funicle and club black; sixth funicle joint and base of club with a row of about six clavate hairs.
   apterus Timb.
4. Head and thorax finely, delicately reticulate; ocelli distinct; mesonotum perfectly flat to apex of scutellum; head, thorax, legs, scape and pedicel about xanthine orange, the remainder of the antennae and the abdomen piceous or black; sixth funicle joint and base of club with a row of about eight clavate hairs.
   bridwelli n. sp.
   Head and thorax smooth and shiny, without reticulations; ocelli very minute; head, thorax, legs, scape and pedicel about capucine yellow, the funicle and club piceous, the abdomen shining black; sixth funicle joint and base of club with a row of about seven clavate hairs ----------*laysanensis* Timb.

Xanthoencyrtus sanguineus n sp. Fig. 9.

Female: In comparison with *apterus* this species differs as follows: Head practically of the same shape, the space between the eyes with about the same proportions and caving in after death very nearly the same, although the triangular raised area in the ocellar region is less prominent or even absent; ocelli practically the same in size, the posterior pair a little closer together than the distance from either to the eye-margin. Antennae longer, the scape much narrower or not over a sixth as wide as long; pedicel about the same, being distinctly

wider at apex than the following joint; the funicle joints all longer than thick, the first nearly twice as long as thick, the sixth about a third longer than thick; club longer but keeping the same proportion to the preceding joints, and the relative proportion of its own joints to each other practically the same. Thorax nearly as in *apterus*, the posterior margin of pronotum gently or deeply, irregularly arcuate, the degree depending apparently on shrinkage, the mesoscutum consequently appearing either transverse or triangularly prolonged medially; scutellum not broadly rounded at apex but rather acute; abdomen shorter or not much longer than the head and thorax combined when the former is stretched forward; ovipositor distinctly although shortly protruded. Sculpture differing remarkably, the head, dorsal surface of the thorax and the abdomen being extremely finely reticulate and producing an opaquely alutaceous effect or not at all shiny as in *apterus*. The whitish pubescence is also much more abundant and conspicuous than in *apterus* and other Hawaiian species, although by no means so conspicuous as in species of *Aphycus, Blastothrix* or some species of *Anagyrus*.

Length: (0.78 to) 1.29 (with head stretched forward); width of vertex: 0.214; width of mesoscutum: 0.285 mm.

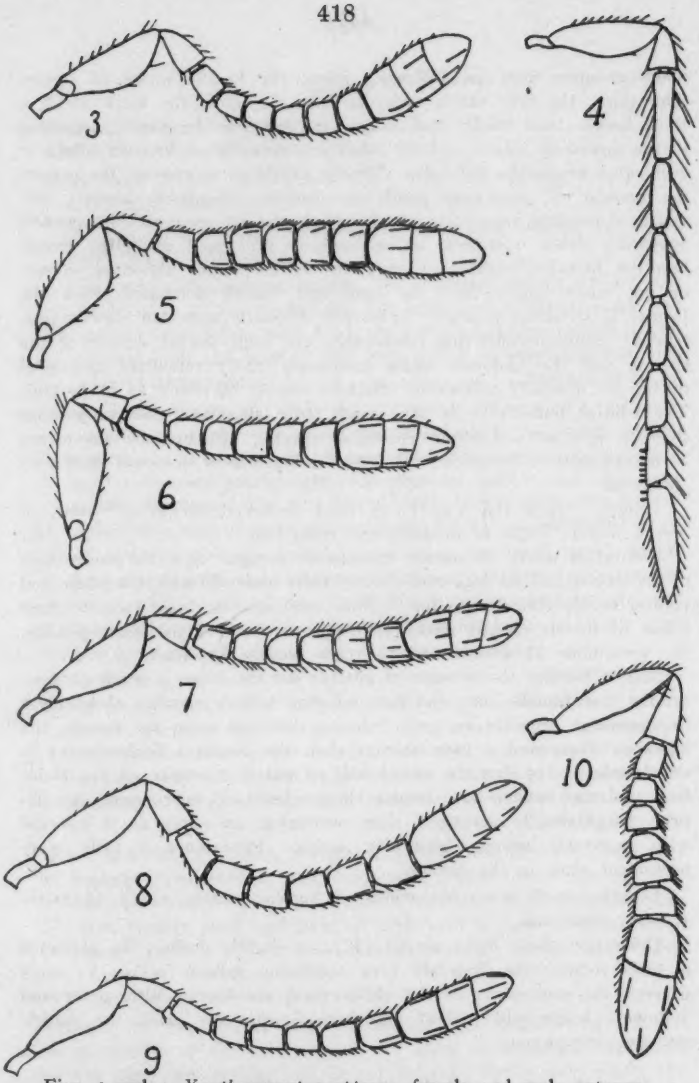
Coloration nearly uniformly bittersweet orange (R.), the under side of the thorax and the legs considerably paler and yellowish, the scape and pedicel nearly concolorous but a little browner, the basal two or three joints of funicle usually dusky yellowish or more rarely dilute piceous, the remainder of funicle and the club piceous or black.

Male: Similar to the male of *apterus* but the scape is much narrower, the last funicle joint and base of club with a row of about eight or sometimes nine clavate hairs; thorax differing as in the female, the abdomen ovate and a little shorter than the thorax. Sculpture as in the female except that the apical half of the first tergite of the abdomen and the intermediate tergites have close set, microscopic lineolations longitudinally arranged, thus producing an effect as if covered with extremely minute, glistening scales. Pubescence a little more prominent than in the female.

Length: (0.50 to) 0.89; width of vertex: 0.216; width of mesoscutum: 0.299 mm.

Coloration about flame scarlet (R.), or slightly darker, the abdomen a little redder, the lineolate area appearing golden yellow in most aspects, the underparts of the thorax and the legs a little paler and yellower; scape and pedicel concolorous with the head, the funicle and the club piceous.

Described from 20 females, 41 males (type, allotype and paratypes) collected on *Eragrostis variabilis* on the north wall of Iao Valley, Maui, about one-half mile from the Needle, July 6, 1919 (Timberlake).



Figs. 3 and 4, *Xanthoencyrtus apterus*, female and male antenna.
Fig. 5, *Xanthoencyrtus laysanensis*, female antenna.
Fig. 6, *Xanthoencyrtus semiflavus*, female antenna.
Fig. 7, *Xanthoensyrtus bridwelli*, female antenna.
Fig. 8, *Xanthoencyrtus semilutens*, female antenna.
Fig. 9, *Xanthoencyrtus sanguineus*, female antenna.
Fig. 10, *Xanthoencyrtus fullawayi*, female antenna.

Xanthoencyrtus semiluteus n. sp. Fig. 8.

Female: From *apterus* differing structurally as follows: Head nearly of the same shape but the eyes considerably smaller so that the space between them from the antennal sockets to the occipital margin is only one-tenth longer than wide (by micrometer measurement), appearing to the eye a little wider than long, and therefore practically as in *semiflavus* although the space is sunken in after death as in *apterus;* ocelli rather more minute, although more prominent by their contrast in coloration with background, the posterior pair considerably more remote from the eye-margins than their distance apart; antennae nearly as in *sanguineus.* Thorax nearly as in *apterus,* the posterior margin of pronotum more gently arcuate, the mesoscutum more transverse and somewhat over twice as wide as its median length, the scutellum broadly rounded at apex. Abdomen conspicuously large, over twice as long as head and thorax combined or rather larger and longer than in *apterus,* the ovipositor shortly protruded. Head, thoracic notum and basal tergite of abdomen very minutely reticulate, the surface considerably more shiny than in *sanguineus* but much less so than in *apterus.* Pubescence very fine and sparse on head and thorax and not easily detected.

Length: 1.17 (with head nearly vertical); width of vertex: 0.216; width of mesoscutum: 0.278 mm.

Head and base of antennae buff yellow (R.), the antennae gradually shading into piceous beginning at the middle of the funicle; thorax maize yellow (R.), the underparts paler, the mesopleura especially being yellowish white; legs nearly maize yellow but paler at base; abdomen about salmon orange (R.).

Male: Structuraly much like the male of *apterus* but the eyes are a little smaller, with the space between wider, the posterior pair of ocelli a little more remote from the eye-margin than their distance apart; scape of antennae narrower, the sixth funicle joint with a row of about five clavate hairs and the base of the club with two or three more; thorax differing as in the female; abdomen ovate, as long as the thorax. Head very finely shagreened and opaque, the thorax sculptured as in the female, the basal tergite of abdomen more coarsely reticulate than in the female, although somewhat more finely than in *apterus;* thorax and abdomen both much less shiny. Pubescence much more abundant than in the female, but not contrasting in color with the body, and rather more abundant than in the male of *apterus,* although less easily seen.

Length: (0.68 to) 0.865; width of vertex: 0.214; width of mesoscutum: 0.285 mm.

Coloration nearly uniformly capucine yellow (R.), the scape and pedicel about concolorous, the funicle and club black, the legs paler or about light orange yellow (R.); in two of the paratypes the coloration is much redder but apparently due to discoloration.

Described from 1 female, 3 males (type, allotype and paratypes) collected on *Eragrostis variabilis* on the south wall of Palolo Valley, Oahu, May 30, 1919 (J. C. Bridwell) and 1 male (paratype) on the same grass on the side of the southernmost ridge of the Koolau Range, Oahu, Nov. 16, 1919 (Bridwell).

Xanthoencyrtus bridwelli n. sp. Fig. 7.

Female: Head slightly wider than in *apterus* in proportion to the length, the space between the eyes a little wider, the ocelli more minute and indistinct, the space separating the posterior pair from the eye-margins distinctly greater than their distance apart; the space between the eyes caved in after death much as in *apterus* but the triangular raised area in the upper part much less prominent and forming anteriorly a right angle instead of an acute angle. Antennae a little stouter, the scape a trifle wider, the funicle stouter so that the pedicel at apex is hardly thicker than the following joint, the first funicle joint somewhat longer and the sixth somewhat wider, the latter being a little wider than long. Thorax practically as in *apterus*, the abdomen apparently somewhat smaller, the ovipositor slightly protruded. Head, thorax and abdomen very smooth and shiny, with no reticulations apparent in any part. Pubescence very sparse and not easily detected.

Length: (0.79 to) 1.32 (with head stretched forward); width of vertex: 0.235; width of mesoscutum: 0.273 mm.

Head and thorax ochraceous orange (R.), the scape and pedicel concolorous, the funicle ochraceous buff (R.), the club piceous and often paler or yellowish at base; legs slightly paler than the body, the hind coxae and femore except at apex and sometimes the middle coxae more or less piceous; abdomen shining black.

Male: Much like the male of *apterus* but the head is wider with the space between the eyes much broader, the ocelli more minute and closer together so that the distance from either of the posterior pair to the eye-margin is considerably greater than their distance apart; scape practically the same, the sixth funicle joint and base of club with a row of about eight clavate hairs arranged five and three on each respectively; thorax similar, the scutellum flat from base to apex; abdomen triangularly to broadly ovate, depending much on manner of drying after death, as long or a little longer than thorax. Head and notum of thorax extremely finely and delicately reticulate, appearing smooth and shiny; basal tergite of abdomen much more distinctly and coarsely reticulate than on the head or thorax, and slightly more finely and more uniformly as to size than in *apterus*. Pubescence very sparse and fine.

Length: (0.55 to) 0.88; width of vertex: 0.216; width of mesoscutum: 0.254 mm.

Coloration of head, thorax, scape and pedicel about xanthine orange (R.), the legs concolorous with the front coxae and all the tarsi paler; flagellum of the antennae and the abdomen piceous or black.

Described from 15 females, 12 males (type, allotype and paratypes) collected on *Eragrostis variabilis* on the south wall of Palolo Valley, Oahu, May 30, 1919 (J. C. Bridwell), and 1 female, 1 male (paratypes) on the same grass at Koko Head, Oahu, 25 ft. elevation, Dec. 15, 1918 (Giffard and Muir).

Xanthoencyrtus apterus Timb. Figs. 3, 4.

Xanthoencyrtus apterus Timberlake. Proc. Haw. Entom. Soc., vol. 4, p. 201, July, 1919.

The following additional material of this species has been collected: 23 females, 46 males on *Eragrostis variabilis,* ridge west of Kalihi Valley (about 1000 ft.), Oahu, June 15, 1919 (Bridwell and Timberlake), nearly one-half of the specimens having been reared from the mealybug, *Trionymus insularis* Ehrhorn, June 17-30, one to three issuing from a host; and 4 females, 11 males on *Eragrostis variabilis,* Manoa Ridge, Oahu, June 1, 1919 (J. C. Bridwell).

The Kalihi specimens are nearly identical with the types from Nuuanu Pali, but the coloration of the females is somewhat paler and without the trace of tawny which may have been due to discoloration in the types. In both series the color is more ochraceous orange (R.) than yellow ocher. The first funicle joint varies considerably in the amount of yellowish coloration and in one female is entirely black; the base of the abdomen is likewise variable, some specimens having the first tergite entirely pale but in one female it is entirely black. In the males the coloration is about orange rufous to flame scarlet (R.).

The Manoa specimens are distinguished by a fine reticulation on the head of the female and by a considerably greater number of dark-colored, minute, bristle-like hairs on the mesoscutum, but the coloration is practically as in the Kalihi specimens.

In the original description, p. 202, line 4, the following correction should be made, for "the latter" read "occipital margin." The ovipositor in this and probably in all the Hawaiian species is hidden in repose, but in most mounted specimens the abdomen is more os less distorted, somewhat in the manner assumed during oviposition so that the ovipositor and sheaths are shortly protruded. The latter are flat and laminate, broader at base and tapering to a blunt point. The abdomen of the male usually remains oval-shaped after drying or not flattening out wider than the thorax and becoming rotund as in the allotype specimen.

Coelopencyrtus orbi n. sp. Figs. 11-13.

Female: Similar to *Coelopencyrtus odyneri* but the head is distinctly wider than long, instead of nearly as long as wide, the face and cheeks shorter, the oral margin of face hardly produced medially; frontovertex wider or about twice as long as wide, slightly widening behind the ocelli but hardly at all anteriorly, the ocelli in an equilateral triangle, the posterior pair not more than their own diameter from the occipital margin. Antennae a little shorter and stouter, the pubescence more prominent and bristle-like, the scape distinctly wider, the funicle joints more transverse but keeping practically the same relative proportion to each other. Sculpture of the same type, although somewhat coarser, especially on the frontovertex and scutellum, the pin-punctures of the frontovertex more prominent. Pubescence much sparser, the eyes bare, the mesonotal bristles not more than one-half as numerous, there being about sixteen along the anterior margin of the mesoscutum and ten along the posterior margin.

Length: (1.00 to) 1.38; width of vertex at ocelli: 0.164; width of mesoscutum: 0.473; length of fore-wing: 1.13; width of fore-wing: 0.490 mm.

Coloration much as in *odyneri* but the mesoscutum does not have the brassy reflections, the scutellum is more metallic with a dark purplish luster, more greenish toward the sides; legs almost entirely black, but the middle tibial spur is yellowish and the tarsi are more or less yellowish or yellowish brown beneath and varying from brown to fuscous above but always blackish at apex of the last joint. Wings more deeply stained, being darker on the basal half and with a distinct fuscous streak at the base along the posterior margin.

Male: Head with the same remarkable structure as in *odyneri* but thinner fronto-occipitally, being only twice as thick above as at the oral margin, and as seen from in front it is no longer than wide and more nearly circular; frontovertex no longer than wide, the frons less protuberant and projecting less in front of the eyes; ocelli in a right-angled triangle, the anterior ocellus just reaching to a line drawn across the anterior margin of the eyes, the posterior pair hardly more than their own diameter from the occipital margin. Scape (Figs. 12, 13) as wide as in *odyneri* but more nearly like *swezeyi* in shape, the upper margin being curved arcuately inward, the lower margin evenly and strongly convex; pedicel with a large conical projection at base on the upper side, otherwise about a third longer again than thick; first funicle joint as wide as long, narrowed somewhat towards the base but not remarkably modified as in *odyneri* or *swezeyi*, following funicle joints all transverse, about equally long and increasing slightly in width distad; club as long as the last three funicle joints combined, considerably wider than the funicle and not strongly inclined as in *odyneri*.

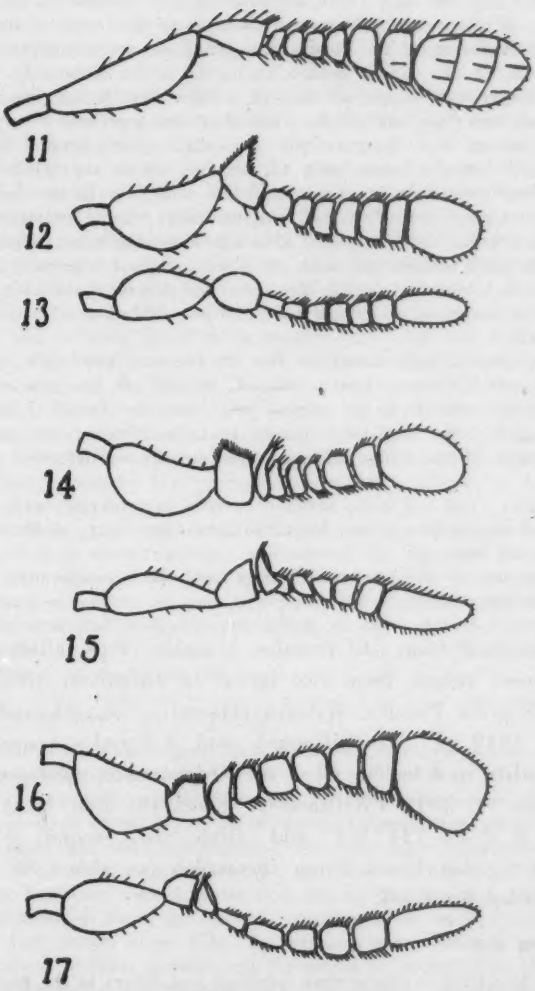


Fig. 11, *Coelopencyrtus orbi*, female antenna.
Figs. 12 and 13, *Coelopencyrtus orbi*, two aspects of male antenna.
Figs. 14 and 15, *Coelopencyrtus swezeyi*, two aspects of male antenna.
Figs. 16 and 17, *Coelopencyrtus odyneri*, two aspects of male antenna.

Lower part of face above antennae with a median carina which widens out above and dissipates a little above the level of the lower corners of the eyes, the subquadrate, shallow, scrobal depression on either side of this carina, limited outwardly at the corners by the antennal socket and margin of the eye, with a smooth and shining surface, and shows no trace of the dense shagreening present in *odyneri* or *swezeyi* except to a comparatively very slight extent around its outer and upper margin; upper part of the face above the scrobes much more shagreened than in *odyneri* and less shiny, the surface being distinctly and finely reticulate, and with numerous minute setiferous punctures practically as in *odyneri*, although less prominent; frontovertex more distinctly shagreened, with the lines arranged fingerprint-like between and behind the ocelli; the setiferous punctures somewhat more prominent and mostly confined to the frons; sculpture otherwise as in the female.

The suberect pubescence on the frontovertex and upper part of face somewhat thinner than in *odyneri*, the tuft of fine pubescence on the pedicel confined to the conical projection, the funicle joints with coarser hair; eyes with very sparse, short, erect hairs; pubescence on other parts of the body differing from *odyneri* as described for the female.

Length: (1.08 to) 1.23; width of vertex at posterior ocelli: 0.216; width of mesoscutum: 0.443 length of fore-wing: 1.03; width of fore-wing: 0.483 mm.

Coloration as in the female except that the antennae are slightly more brownish.

Described from 213 females, 9 males (type, allotype and paratypes) reared from two larvae of *Odynerus orbus* Perkins, Kipuka Puaulu, Kilauea, Hawaii, Nov. 21 and Nov. 28-29, 1919 (F. X. Williams), and 2 females (paratypes) found alive in a sealed cell of this *Odynerus* at the same locality, Nov. 1, 1919 (Williams). From the first larva there issued 2 ♂♂, 124 ♀♀, and from the second 6 ♂♂, 104 ♀♀, this brood being incomplete as about 35 pupae were killed by Acari.

Xesmatia n. g.

Closely related to *Ooencyrtus* Ashmead and differs in the female sex as follows: Head of the same shape and structure, although slightly thinner fronto-occipitally, antennae similar but the club somewhat larger; mandibles differing considerably in having three teeth, none very acute, the middle one much the largest, the upper and lower teeth both rather obscure, giving the appearance of a broad apex with a single median

tooth (in *Ooencyrtus* the mandible has an acute ventral tooth and a broadly truncate inner one); palpi practically the same, the maxillary pair with four short, nearly equal joints, the labial pair with two subequal, short joints.

Thorax similar, the axillae well separated at their tips as in *Ooencyrtus;* the scutellum a little larger and broader with the apex more rounded. Wings nearly the same, the marginal vein punctiform, the stigmal somewhat shorter than in *Ooencyrtus* and triangularly enlarged from base to apex with a short spur at apex projecting towards the costal margin; discal and marginal ciliation similar, the speculum however, greatly widening below. Legs similar, the middle tarsi slenderer and less strongly tapering towards the apex; the middle tibial spur slender and as long as the first tarsal joint.

Abdomen considerably smaller, after drying no longer than half the thorax and as wide, being much broader than long and well rounded at apex; the dorsum beyond the first tergite caving in after death in a peculiar manner, the venter, however, not compressed but broadly rounded from side to side in the form of nearly a semicircle near the base of abdomen; vibrissal plates situated on either side of the dorsum about half way between the base and apex and withdrawn within the dorsal concavity, the vibrissae consequently difficult to trace but reaching to the apex.

In sculpture differing appreciably, the surface of all parts of the head and body much smoother and shinier, for although fine, delicate reticulations occur on the head and mesoscutum, they do not produce a shagreened appearance as in *Ooencyrtus,* the scutellum, moreover, entirely smooth and polished; pubescence of the same character as in *Ooencyrtus.*

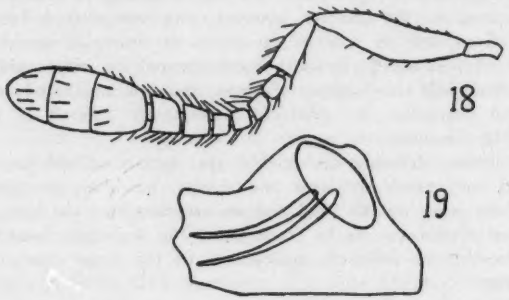
Genotype: *Xesmatia flavipes* n. sp.

Xesmatia flavipes n. sp. Figs. 18, 19.

Female: Head moderately thin fronto-occipitally, somewhat broader than long, being thickest and widest across the middle of the eyes, the dorsal surface well rounded from side to side; frontovertex occupying about one-third of the width of the head in dorsal view, about a third longer again than wide and becoming somewhat wider behind the ocelli; the latter in a right-angled triangle, the posterior pair somewhat less than one-half their own diameter from the eye-margins and about twice as far removed from the occipital margin; eyes very broadly oval or but little longer than wide, the inferio-posterior margin much less curved than the inner margins; cheeks somewhat shorter than the width of the eyes and rather strongly curved in towards the mouth as seen from in front; face nearly as wide as long, the scrobes in the form of a moderately deep, broadly ovate depression covering its larger part, reaching upward between the eyes to the anterior limit of the frons, and divided by a rather wide longitudinal ridge which runs about two-thirds of the length of the depression from the antennal sockets up-

ward. Antennae inserted rather close to the oral margin and well separated by the facial ridge, the distance between the sockets being about one-fourth less than the width of the frons; scape compressed linear, slightly widened at the middle and excluding the radicle about four times longer than wide; pedicel thicker at apex than the basal funicle joints and nearly as long as the first three of these combined; funicle increasing gradually in width distad, the first four joints subequal in size, the first being slightly longer than thick, the fourth slightly thicker than long, last two funicle joints larger and subquadrate; club large, oval, practically as long as the entire funicle and twice as wide as the preceding joint, its first joint distinctly longer than either of the following two.

Thorax strongly convex above, yet somewhat wider than its depth; pronotum strongly arcuate, the visible part very short; mesoscutum more than twice as wide as long, its basal margin slightly produced



Figs. 18 and 19, *Xesmatia flavipes*, female antenna and mandible.

medially in a broad curve between the tips of the axillae; the latter rather small, distinctly separated medially and about twice as wide as long; scutellum large, strongly convex throughout, the apex well rounded, the lateral margins but little elevated and hardly declivous; propodeum very short medially, but triangularly enlarging at the sides, the metapleura small. Wings reaching far beyond the apex of abdomen and about normal in width; the disk finely, closely ciliated, the area below the submarginal vein with coarser, longer cilia arranged in about five oblique, transverse rows and with a sixth row parallel and close to the vein; marginal vein falling somewhat short of the middle of the disk; speculum not quite reaching to the stigmal vein, greatly and triangularly widening below, and above on the distal side where it becomes suddenly narrowed with parallel sides it is guarded by a row of five cilia, which are hardly longer than others of the disk but much thickened at base; submarginal vein set with about twelve moderately long, slender bristles.

Cheeks and mesopleura with microscopic reticulations faintly im-

pressed; prepectal plates and sides of the scrobal impression of the face more evidently and somewhat more coarsely reticulate; mesoscutum and base of the scutellum more faintly and minutely reticulate; facial ridge and most of the scutellum almost perfectly smooth and highly polished; frontovertex smoothish and with a few scattered minute pin-punctures; abdomen smooth and shiny, apparently without reticulations; the reticulations of all parts of the body are so faint that the general effect is of a smooth and polished surface except possibly on the sides of the scrobal impression and on the prepectal plates. Pubescence consisting of fine, brownish colored hairs of moderate length, rather sparse on the cheeks and frontovertex and moderately abundant on the mesoscutum; scutellum with only about a dozen such hairs on the basal half and two longer, more bristle-like hairs at apex; abdomen sparsely pubescent along the lateral and apical margins; pile of the eyes rather sparse and short; antennae with the usual vestiture of bristle-like hairs, most abundant on the pedicel and funicle, the club with considerably shorter, more erect hairs, which are abundant even to the apex.

Length: (0.74 to) 0.75; width of vertex at posterior ocelli: 0.143; width of mesoscutum: 0.398; length of fore-wing: 0.938; width of fore-wing: 0.431 mm.

General coloration metallic bluish black, the cheeks with a greenish luster, the frontovertex with a comparatively dull, bluish luster; mesoscutum with a strong blue and scutellum with a refulgent bluish green luster; pleura nearly pure black; luster of abdomen slightly greenish and partly iridescent especially on the basal tergite. Scape yellow ocher (R.), the flagellum yellowish brown, the upper side of pedicel and the club darker brown (the rest of the pedicel and the funicle when mounted in balsam appearing nearly as yellowish as the scape). Front legs nearly fuscous, yellowish only at the knees and apex of the tibia, the tarsi brown; middle and hind legs mostly yellow ocher (R.), but somewhat brownish along the upper margin of the femora and near the base of the tibiae on the upper side, the last joint of the tarsi brown. Wings hyaline, faintly tinged with brownish around the stigmal vein and along the posterior margin at the base; the veins brownish yellow.

Male: Not known.

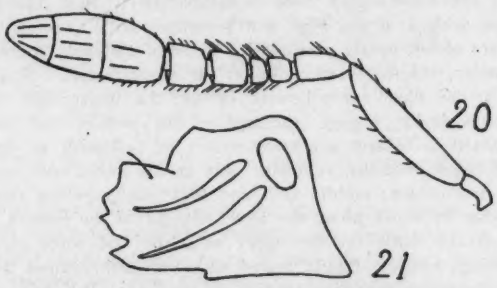
Described from one female (type) collected on or near the rim of Palolo Crater, Oahu, Dec. 20, 1918 (J. C. Bridwell) and one female (paratype) collected at the head of Waianae Valley, Oahu, about 2400 ft. elevation, June 1, 1919 (Timberlake).

This species may possibly be endemic, but we can have no positive evidence on this point until the species is reared

On account of its small size and close relationship to *Ooencyrtus* it may prove to be an egg-parasite.

Plagiomerus hospes n. sp. Figs. 20, 21.

Female: Head considerably wider than long, the face abruptly inflexed from the horizontal frons, moderately thick above but becoming much thinner toward the mouth; occiput but slightly concave, the margin above rather acute; dorsal surface of head strongly convex; eyes mostly dorsal but the anterior margin reflexed on to the plane of the face rather more widely than in *Plagiomerus diaspidis* Crawford*, also larger than in that species, and in the form of a nearly equilateral triangle with the inner margins straighter and parallel; frontovertex comparatively narrow, apparently somewhat over twice as long as wide, the ocelli in a right-angled triangle with the posterior pair practically touching the eye-margins and rather remote from the occipital margin; cheeks about equal to the length of the eyes and arcuately converging towards the mouth; face broad, the scrobes in the form of a triangular, rather deep depression, reaching upward between the eyes to the anterior margin of the frons, separated on either side from the eye-margins by a convex rather wide space and divided on the lower three-fourths of its length by a rounded, triangularly shaped ridge broadest between



Figs. 20 and 21, *Plagiomerus hospes,* female antenna and mandible.

and somewhat below the antennal sockets. Antennae inserted slightly less than half way from the oral margin to a line connecting the lower corners of the eyes, the sockets widely separated by the facial ridge, their distance apart a little less than the distance from either to the nearest point of the corresponding eye; scape rather long and reaching slightly beyond the plane of the frons, compressed but linear, the lower margin somewhat convex; pedicel a little wider at apex than the following

*The head in all available specimens is much shrunken so that this difference may be illusory.

joint, and somewhat longer than the first two funicle joints combined; funicle moderately increasing in thickness distad, the first joint about as wide as long, the second shorter and transverse, the last two much larger, the third being as wide as long and the fourth slightly transverse; club large, elongate oval and pointed at apex, considerably wider than the funicle and almost as long as the pedicel and funicle combined, its first joint the longest and the apical one a little the shortest. Mandibles with a short sharp spine on the ventral margin, the apical margin not greatly narrower than the base, with an acute ventral tooth rather deeply divided from the remaining edge, which is obliquely inclined and divided into three short rather acute teeth. Palpi short and transparent white; the maxillary pair four-jointed, with the apical joint considerably the longest, the middle joints subequal and about as long as wide, the basal joint about two-thirds as long as the apical; labial pair short, wide at the middle and tapering to either end, the basal joint slightly longer than the second.

Thorax strongly depressed and not very deep, about a fourth longer than wide; pronotum strongly arcuate; mesoscutum nearly twice as wide as long, its posterior margin slightly angulate at the middle; axillae fully twice as wide as long, being narrowly transverse and meeting at their tips; scutellum a little wider across the base than its length, the apex forming an angle of about 90 degrees, the disk flat, not much elevated and sloping downward around the apical margin; propodeum very short medially, triangularly enlarging towards the sides, the metapleura small. Abdomen depressed with the dorsum slightly sunken in after death, the outline as seen from above subtriangular with the basal corners and apex rounded, the length and width about equal to the thorax; fifth ventrite reaching only to the middle of the venter leaving the ovipositor free beyond this point, the sheaths shortly protruded, slender, terete and abruptly tapering at apex.

Legs of normal structure, the middle tibial spur very slender and tapering, almost as long as the first tarsal joint which is equal to the following four joints combined. Wings reaching far beyond the apex of abdomen and moderately narrow; disk moderately densely ciliated but more sparsely and coarsely in the angle between the speculum and submarginal vein, much of the rest of the basal area with finer and transparent cilia, the extreme base bare; speculum narrow, reaching practically to the posterior margin and separated from the hairless streak along the margin by only one row of transparent cilia, much narrowed above and falling considerably short of the venation; apex of venation not quite reaching to the middle of the wing, the submarginal vein somewhat enlarged before its apex although not so distinctly as in *diaspidis*, the marginal vein about five times as long as thick and considerably longer than in *diaspidis*, the postmarginal and stigmal veins about equal, each nearly a third as long as the marginal, the stigmal triangular, narrow at the base and enlarged at apex.

Face finely reticulate, more delicately and a little more finely on the

median ridge and changing to very closely lineolate on each side exterior to the antennal sockets and on the cheeks; vertex much more finely but more rugosely reticulate, gradually becoming almost smooth on the frons, an orbital row of very fine, shallow pin-punctures on each side of the frontovertex, and a few scattered over the frons; mesoscutum distinctly reticulate with the lines running transversely; axillae transversely lineolato-reticulate; scutellum with crowded, microscopic thimble-like punctures appearing granular at lower magnifications and opaque in most aspects, the obliquely sloping latero-apical margin smooth and highly polished; metanotum and propodeum smooth, the metapleura highly polished; mesopleura finely reticulate with the lines running mostly lengthwise; abdomen smooth and shiny, the apical tergite, however, rather rugosely reticulate except on the sides. (*Diaspidis* has a smoother face with the reticulations indistinct except on the facial ridge, and the thimble-like punctures of scutellum appear to be slightly coarser).

Eyes with very sparse and extremely short pile; pubescence on other parts of head also short and sparse, yellowish white in color and confined to the frontovertex and lower part of the face; that on the thorax blackish and rather sparse and short on the mesoscutum, much longer on the scutellum and more bristle-like especially towards the apex, the four scale-like bristles at the apex very narrow and all nearly equal in length (in *diaspidis* these bristles are comparatively wide with the anterior pair much the shorter); pubescence on the basal corners of the propodeum, the sides of the abdomen and on the protruded part of the ovipositor sparse, fine and pale-colored.

Length: (0.80 to) 1.03; width of vertex at the anterior ocellus: 0.101; width of mesoscutum: 0.433; length of fore-wing: 1.03; width of fore-wing: 0.436; length of protruded part of ovipositor: 0.113 mm.

General color metallic bluish black, the luster of head bluish, becoming purplish on the sides of the face and greenish on the facial ridge; luster of thorax mostly bluish or bluish-green and slightly purplish in part, the scutellum usually appearing dull black, its apex, however, the lateral margins as well as the metapleura brilliant metallic green and brassy; abdomen brilliant metallic green on the first tergite and lateral margins near apex, the remainder with various metallic reflections but usually dark purplish and bronzy. Basal half of the scape, pedicel except at apex, first two funcle joints and club black; the rest of scape, apical third of pedicel and last two funicle joints yellow. Legs mostly yellowish white with the front and hind coxae and femora except at base black, the middle femora with a narrow black ring just before the apex and rather indistinct on the under side; front tibiae with a black ring reaching about to the middle, the base narrowly white; a similar ring on the middle tibiae only slightly wider than the preceding white base and falling considerably short of the middle; hind tibiae with a broad black ring reaching a little beyond the middle and leaving the base narrowly white; the tarsi slightly more yellowish

beneath, and the tip of the last joint blackish. Wings hyaline, the veins yellowish but the stigmal and the submarginal except at base and apex are much more transparent than the rest of the venation.

Male: Not known.

Described from four females (type and paratypes) collected at Nuuanu Pali, Oahu, Oct. 19, 1919 (W. M. Giffard).

This species is very similar to *Plagiomerus diaspidis* Crawford but can be distinguished by the nearly bare eyes, the narrower wings and frontovertex and by the slender lamelliform bristles on the scutellum. The coloration is similar but the black band on the middle femora is much narrower.

The host of *hospes* is unknown but judging from the habits of other members of the genus it should prove to be a Diaspine scale. The species is no doubt immigrant and presumably came from some part of America as the genus has not been recognized hitherto outside of North America. As no males of *Plagiomerus* have been discovered it is becoming apparent that the species are thelyotokous and maleless under ordinary circumstances.

Anabrolepis n. g.

Female: Head as seen from the side distinctly triangular and as seen from above almost perfectly semicircular in outline; the dorsal surface much flattened especially in the longitudinal axis, its plane forming an acute angle with the strongly obliquely inclined ventro-anterior surface although the angulation is somewhat rounded off; eyes and frons not entirely dorsal but continued distinctly beyond the angulation on to the ventro-anterior surface; anterior orbits of the eyes with a distinct but narrow furrow continuous across the face between the eyes, thus marking the anterior boundary of the frons and lined throughout with silvery white, short and recumbent hairs. Antennae rather short and stout, the scape compressed and a little widened towards the apex, the pedicel rather short and thick, the funicle six-jointed with the joints mostly transverse, the club slightly longer than the funicle.

Thorax depressed, the mesoscutum being very flat; scutellum a little wider than long, at apex nearly rectangular and without any bristles. Abdomen triangular as seen from above, a little narrower than the thorax and about as long, the ovipositor shortly protruded. Wings nar-

row, marked with a longitudinal fuscous band and several rays along the margin alternating with hyaline spots; marginal vein stout and about four times as long as thick although much obscured by numerous strong bristles, the stigmal vein about one-half as long, the postmarginal short and spur-like.

Male: Not known.

Genotype: *Anabrolepis extranea* n. sp.

This genus is closely allied to *Habrolepis* Förster and *Adelencyrtus* Ashmead, but is distinguished from the former by the absence of lamelliform bristles on either the vertico-occipital margin or apex of the scutellum and by the different wing pattern, and from *Adelencyrtus* by the flattened dorsal surface of the head, which is more acutely angled with the anterior surface, and by the fuscous rays on the wings. The European species, *Encyrtus zetterstedtii,* hitherto placed in *Habrolepis* no doubt belongs here and may be known as *Anabrolepis zetterstedtii* (Westwood).

The following analysis of the described *Habrolepis*-like genera while not entirely satisfactory, because prepared in part from descriptions only, may help the student to distinguish these interesting forms. It is rather significant that of the seven genera three are represented in Hawaii by an immigrant species. This relatively high proportion is probably due to the fact that the species are parasitic in common and frequently transported scale-insects, and secondly that thelyotokous reproduction is apparently the rule in the group and thus their establishment in a new locality is made comparatively easy.

Characters common to the group of *Habrolepis*-like genera: Head triangular in side view with the face strongly reflexed, the planes of the face and frons meeting in a more or less acute angle; antennae simple and usually moderately clavate, the funicle with four or six joints; mandibles much flattened or not curved inward at apex, the ventral margin with a strong preapical spine, the apex not greatly narrower than the base, and armed with an acute ventral tooth and an obliquely inclined inner margin variously subdivided into two to four additional teeth; the vertico-occipital margin ornamented in three genera with a pair of lamelliform bristles, the scutellum in four genera with one or two pairs of similar but usually wider bristles.

Females.*

1. Funicle six-jointed ---- 4

   Funicle four-jointed.

   Scutellum with one or two pairs of lamelliform bristles at apex---2

   Apical bristles of scutellum not modified.
   Marginal vein thrice as long as wide, the stigmal and portmarginal subequal and about two-thirds as long as the marginal; mandibles with small, subacute teeth; wings hyaline with a fuscous area beneath the apex of venation----------*Parahomalopoda* Girault

2. Dorsal surface of the head flattened or only slightly convex from side to side; the vertico-occipital margin with a pair of slender lamelliform bristles, the apex of scutellum with one pair of wider bristles; wings with fuscous rays from a median longitudinal band ----------3

   Dorsal surface of head convex with the eyes almost wholly dorsal; the face inflexed but meeting the plane of the frons in a broad curve, the scrobal impression triangular limited above by a semicircular rounded ridge just in front of the eyes; vertico-occipital margin rather acute and with a pair of simple bristles, the scutellum with two pairs of lamelliform bristles; wings hyaline---*Plagiomerus* Crawford

3. Antennae slender, the scape not expanded beneath, the funicle joints longer than thick----------*Homalopoda* Howard

   Antennae short and stout, the scape dilated towards the apex, the funicle joints much wider than long and subcompressed.
   Pseudhomalopoda Girault

4. Scutellum without specialized bristles at apex----------5

   Scutellum with a pair of broad lamelliform bristles at apex.

   Face very strongly reflexed, vertico-occipital margin with a pair of lamelliform bristles; antennae slender or but weakly clavate; wings fuscous with a pair of hyaline spots beyond the venation and a subapical, hyaline cross-band----------*Habrolepis* Foerster

5. Dorsal surface of the head flat or only slightly rounded from side to side, and semicircular in outline, the anterior surface sharply reflexed although the angulation is somewhat rounded off; eyes and frons not entirely dorsal but distinctly reflexed on to the anterior surface; anterior orbits of the eyes with a silvery pubescent, narrow furrow continuous across the face; wings with fuscous rays from a median longitudinal band----------*Anabrolepis* n. g.

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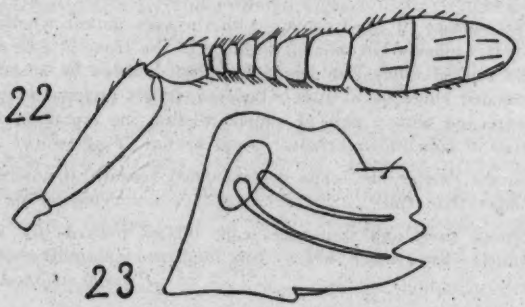
*The male has been described only for genus *Habrolepis*. It has two short ring-like funicle joints and an elongate cylindrical club.

Dorsal surface of the head strongly convex and broadly cresentic in outline, the anterior surface less sharply reflexed and the angulation strongly rounded off in a broad curve; anterior orbits of the eyes not furrowed and without a silvery pubescent line; wings hyaline or faintly fuscous with two triangular hyaline areas forming a cross-band just beyond the venation...*Adelencyrtus* Ashmead

Anabrolepis extranea n. sp. Figs. 22, 23.

Female: In side view of the head the facial side of the triangular outline is the longest, the dorsal and occipital sides nearly equal and forming a right angle; in frontal view the head is much wider than long, the outline of the eyes and frons forming a semicircle; occiput wider than long, not much concave, the neck inserted above the center; eyes triangular, the inner side slightly longer than the posterior, the anterior side still longer and on the ventro-anterior surface of head; frontovertex considerably widening posteriorly and nearly twice as long as the



Figs. 22 and 23, *Anabrolepis extranea*, female antenna and mandible.

posterior width when the anterior, reflexed part of frons is counted in, the occipital margin rather acute and without bristles; ocelli arranged in a small equilateral triangle placed in the middle of the dorsal part of the frontovertex, the anterior ocellus considerably in front of the middle, the posterior pair a little behind the middle, about one-half their own diameter from the eye-margin and very remote from the occipital margin; cheeks as long as the posterior margin of the eyes and arcuately converging towards the moderately wide mouth; face wider than long, flattened and impressed with a median scrobal depression, divided by a short median rounded ridge and bounded above by a rather broad convex space which forms a broad curve or semicircle between the depression and the eyes, the grooved pubescent line at the orbits also in the form of a semicircle, the oral margin with a broad, deep median sinus. Antennae inserted rather far apart, the space between the sockets equaling the width of the frons, and rather far above the oral margin or just below a line drawn between the lower corners of

the eyes, with upper ends of the sockets almost touching this line; scape subcompressed, wider towards the apex or clavate in outline as seen from the side, and rather short or barely reaching to the plane of the frontovertex; pedicel about one-half longer than thick, much thicker at the apex than the following joint and a little longer than the first three funicle joints combined; flagellum short, distinctly but not greatly clavate; first four funicle joints all short, transverse and about equal in length, the last two funicle joints twice as long as the preceding joints, the fifth about as long as its apical width, the sixth a little wider than long; club narrowly ovate, rounded at apex, considerably wider and a little longer than the funicle, its basal joint somewhat the longest. Mandibles with a sharp spine on the ventral margin, the apex broad, with two strong acute, ventral teeth and a broad inner truncate margin. Maxillary palpi slender, moderately long, the basal joint a little longer than the second or third which are about equal, the fourth joint as long as the first two combined; labial palpi short and stout, the apical joint slightly longer than the basal and rounded at apex.

Thorax depressed, its depth hardly greater than one half the width, and about one half longer again than wide; pronotum deeply arcuate and narrow; mesoscutum very flat, about one half wider again than long, its posterior margin slightly angulate at the middle; axillae short, considerably over twice as wide as long, and meeting at their tips; scutellum a little wider than long, about rectangular at apex, the disk nearly flat, not greatly elevated and abruptly sloping downward along the lateral margins; propodeum very short medially but triangularly enlarging towards the sides, the metapleura small and narrow but reaching to the hind coxae. Dorsum of abdomen moderately sunken in, the venter depressed with the fifth ventrite reaching about to the middle and leaving the ovipositor free; protruded part of the ovipositor sheaths terete; vibrissal plates situated on the lateral margins of the dorsum half way between the base and the middle, the vibrissae falling considerably short of the apex.

Legs normal, the tarsi slender and not thickened at base, the first joint of the middle pair as long as the four following joints combined and a little longer than the slender tibial spur. Wings narrow, reaching considerably beyond the apex of the abdomen; venation reaching to the middle of the disk; submarginal vein somewhat enlarged and slightly broken at a point one third of its length from the distal end, marginal vein stout and about four times longer than thick, stigmal vein about one half as long, narrow at base and triangularly enlarged at apex, the postmarginal short and spurlike; speculum narrow and of equal width throughout, falling somewhat short of the stigmal vein but extending to the bare area along the posterior margin of the wing, and interrupted near its lower end by two stout bristles; marginal cilia rather long, the discal cilia extremely various and helping to form the fuscous rays and band, those on the base of the disk before the specu-

lum in the form of stout, tapering moderately long bristles with the one contiguous to the thickened part of the submarginal vein about twice as long as all the rest; those on the darkest fuscous areas beyond the speculum similar along the anterior margin of the disk but becoming somewhat finer on the median band and along the posterior margin, and interspersed throughout in the fuscous areas with much shorter, blunt and flattened bristles; cilia of the clear areas in part extremely fine and transparent and partly black and somewhat coarser, these dark cilia being distributed over the whole of the subapical clear spot on the posterior margin, or the inner half of the corresponding spot on the anterior margin, and along the inner margins of the median pair of clear spots, covering the inner third of the anterior one of this pair; bristles on the submarginal vein pale colored, very slender and rather long; those on the marginal vein much shorter and stouter, being flattened and spear-shaped.

Face and cheeks with a fine delicate reticulation more evident on the sloping dorsal sides of the scrobal impression; mesoscutum much more distinctly and somewhat more coarsely reticulate; mesopleura extremely finely reticulate and nearly opaque; axillae finely, closely and transversely lineolate; frontovertex with crowded thimble-like punctures, considerably coarser than those on the scutellum of *Plagiomerus* yet very fine although not producing an opaque effect, and becoming obsolete anteriorly on the reflexed part of the frons; the latter with two distinct pin-punctures arranged in a transverse line at the angulation and another pair just posteriorly on the dorsal part of the frons but considerably obscured by being located at the edge of the thimble-punctured area; scutellum with similar and a little coarser thimble-punctures on the disk but becoming smooth and polished on the sloping sides and more narrowly at apex; metanotum and propodeum rather dull but without evident sculpture; abdomen mostly smooth and polished but becoming finely reticulate on the last tergite except at the sides.

Pubescence throughout very sparse and inconspicuous; the eyes bare, the other parts of the head nearly bare except for the narrow, semicircular orbital line of silvery white, recumbent hairs bounding the dorsal limits of the face; mesoscutum with sparse, fine, bristle-like and blackish hairs seriately arranged; scutellum with about six bristle-like hairs towards the base, somewhat longer than those on the mesoscutum, and with apparently no bristles at all at apex; apex of abdomen and protruded part of ovipositor with short, delicate, pale-colored pubescence.

Length: 1.07; length of head: 0.307: width of head: 0.356; width of vertex at the posterior ocelli; 0.106; width of mesoscutum: 0.362; length of fore-wing: 0.912; width of fore-wing: 0.372; length of protruded part of ovipositor: 0.134 mm.

Head and notum of thorax metallic green, the sloping sides of the scrobal impression with a purplish luster, the reflexed part of the frons bluish green; mesoscutum with more brilliant brassy and golden reflections, the underparts of the thorax black and but slightly shiny;

abdomen metallic blue with a moderately strong luster, the sunken in area of dorsum more blackish, the ovipositor sheaths black, the spicula yellow. Antennae black, the funicle and the club somewhat more brownish, the sixth funicle joint yellow, the club slightly yellowish towards the apex. Front legs brown, with the base of the femora and the tarsi yellowish, the apical half of the tibiae yellow; middle and hind legs black, with the apical half of the middle tibia, apex of hind tibiae and both pair of tarsi, except apex of the last joint, yellow.

Fore-wings marked with fuscous rays from a longitudinal band arising from the integumentary pigment and from the dark ciliation as follows: A large quadrate fuscous area beneath the venation from the break in the submarginal to the apex of the stigmal vein enclosing a small hyaline spot between the speculum and the apical part of the submarginal vein; the first two rays on the anterior margin produced by this hyaline spot and located respectively at the break in the submarginal, and beneath the marginal and stigmal veins; the quadrate area further enclosing a central hyaline spot beneath and beyond the speculum, but the posterior margin of the disk remaining dark so that the rays on the margin at this point are not differentiated; the fuscous area continued beyond the venation as a broad median longitudinal band constricted before the apex and then triangularly enlarged at apex; the band sending out two rays above, the third and fourth on the anterior margin, one just before the constriction, the other at the apex and continuous with the triangular enlargement; the band further emitting one ray, which is narrowed at its base, just before the constriction towards the posterior margin, but the apical ray on this margin is not differentiated from the triangular enlargement of the band; the four rays on the anterior margin much darker than the rest of the fuscous area or nearly black, the first one narrowest, the others increasing gradually in width from the second to the fourth; the first pair of hyaline spots beyond the venation quadrate, the one on the anterior margin nearly square, the other a little longer than wide; the second or subapical pair of hyaline spots both wider than long; most of the submarginal vein brownish yellow, its apical part and the stigmal vein nearly hyaline, the marginal vein brown. Hind-wings entirely hyaline.

Described from 1 female (type) collected on the Manoa Cliffs Trail, Tantalus, Oahu, Oct. 26, 1919 (W. M. Giffard). This certainly must be an immigrant species but it is not yet apparent from what part of the world it was derived, although an Oriental origin is suspected.

Fig Wasps.—Mr. Ehrhorn exhibited a Philippine fig containing galls from which fig wasps had been dissected. The latter were also exhibited.

Anomala flavilabris.—Mr. Ehrhorn exhibited a specimen of this beetle killed by fungus. It had been sent from Japan by Mr. Langford, who wrote that thousands of the beetles were found dead on the ground in a locality near Tokyo. Mr. Ehrhorn stated that the pathologists of the Experiment Station, H. S. P. A., were attempting to cultivate the fungus, and that they thought it to be the same as the fungus introduced by Mr. Muir from the Philippines a few years ago.

Callithmysus koebelei.—Mr. Bridwell exhibited a specimen of this beautiful beetle, bred from mamake *(Pipturus albidus),* and stated that he found the larvae in considerable numbers about two months ago on the Manoa Cliffs trail. He also reported finding larvae of another species in *Byronia* at the same place; and additional larvae of the species in *Pittosporum* on the windward side of Mt. Konahuanui.

Dolichurus stantoni.—Mr. Bridwell remarked on the great decrease in roaches of the genus *Phyllodromia,* brought about by the recently introduced *Dolichurus* from the Philippines, and paralleling the case of *Anomala orientalis* being quickly reduced to harmless numbers by the introduction of *Scolia manilae* from the Philippines.

Aphis middletoni.—Mr. Timberlake identified an Aphid which Mr. Swezey had found on the roots of *Coreopsis* in Kaimuki, as this species and stated that he had found it also on China aster. Mr. Ehrhorn added that this species was found commonly by Mr. Marsh on asters as early as 1910, and that it caused considerable damage to the plants.

DEFERRED BUSINESS.

The Committee on Entomological Organization submitted a report, containing recommendations to the Bishop Museum and the Committee of the National Council of Research, on entomological work in the Pacific. The report was accepted and the Secretary ordered to communicate a copy to Dr. H. E. Gregory, Director of the Bishop Museum, and to print the same in the Proceedings. The Committee was then discharged and its work transferred to the Executive Committee with the addition of J. C. Bridwell.

The President announced the appointment of Messrs. Timberlake, Pemberton and Bridwell as a Committee on Common Names of Economic Insects, Mr. Timberlake to act as chairman.

Report of the Committee on Entomological Organization.

(Submitted Dec. 9, 1919)

BIOLOGICAL PROBLEMS OF THE HAWAIIAN INSECT FAUNA.

In the recommendations made by this Committee for lines of entomological work appropriate to be carried on by the Bishop Museum, and presented to the Society for consideration at a special meeting June 17, 1919, and later transmitted to the Director of the Museum, one topic was designated, "Biological Problems," in connection with the endemic insect fauna, without giving detailed statement of such problems. The Committee now presents a detailed outline of certain lines of work open for research investigations with the endemic Hawaiian insect fauna.

1. *Life Histories in General.*

Much remains to be done in working out life histories and other habits in all the Orders of insects; and the discovery of their food plants and host relations, or other food habits.

Special Subjects.

Lepidoptera.

Leafminers of *Pelea* (*Opostega* sp.).
Other leafminers.
Banana moths.
Leafroller caterpillars.
Wood feeding caterpillars.
Fruit and seed caterpillars.
Discovery of food plants of caterpillars in genera in which they are at present unknown, e. g.: *Mestolobes, Orthomecyma,* etc.
Habits of the case moths of the large genus *Hyposmocoma* (170 species).

Hymenoptera.

Nesting habits of wasps.
Food of predatory and parasitic wasps.
The genus *Sierola* and host relations.
The genus *Sclerodermus* and host relations.
The genus *Eupelmus* and host relations.
Parasites of *Lepidoptera.*
Parasites of scale insects.
Parasites of mealy bugs and *Aphis.*
Parasites of *Delphacidae.*
Parasites of *Coleoptera.*

Coleoptera.

The *Carabidae.*
The longhorn beetles *(Plagithmysides).*
The genus *Heteramphus.*
The genus *Rhynocogonus.*
The genus *Proterhinus.*
Beetles in relation to the declining forests.
Beetles feeding in dead wood.
Predacious beetles.
Flightless beetles.
Hosts of *Laboulbeniaceae.*
Scavenger beetles.
Parasitism of *Coleoptera.*

Diptera.

Aquatic *Diptera.*
Leafminers.
Parasitic *Diptera*
The crane flies.
The genus *Dyscritomyia.*
The genus *Drosophila* (many native species).

Homoptera.

The Jumping Plant-lice *(Psyllidae).*
Leafhoppers *(Delphacidae).*
The genus *Oliarus.*
Tree hoppers *(Jassidae).*
Endemic mealy-bugs.
Parasitism of *Homoptera.*

Heteroptera.

Predacious bugs
The genus *Oechalia.*
The genus *Reduviolus.*
The genus *Nysius.*
The *Capsidae.*

Orthoptera.

Predacious forms.
Parasitism of *Orthoptera.*

Odonata, Neuroptera, etc.

Habits of the *Hemerobiids.*
Parasitism of the *Hemerobiids.*
Discovery of larval habits of native antlion.
Dragon-flies.
Psocidae.

Studies in Variation, including breeding experiments, can be carried on with several of the groups. This line of research is specially attractive here, for six or more generations may be had per year.

Of these special subjects, those with reference to *Hymenoptera* have several of the members of the Society specially interested in them: the *Aculeates*—Messrs. Giffard, Williams, Timberlake and Bridwell; the *Parasitica*—Messrs. Fullaway, Timberlake, Bridwell and Swezey.

In the *Lepidoptera,* Mr. Swezey has been carrying on researches in most of the lines mentioned.

In *Coleoptera,* Messrs. Giffard, Bridwell and Swezey are especially interested in certain problems, and Dr. Perkins is still doing systematic work with the beetles.

The *Diptera* are receiving less attention than some of the Orders. They have been considerably neglected in the past.

The *Homoptera* have several working on them: Messrs. Giffard, Muir, Timberlake, Swezey, Bridwell and Crawford.

The *Heteroptera* are not being actively dealt with just at present, nor are the other Orders: *Orthoptera, Odonata, Neuroptera,* etc., though much material is at hand for working, especially in the *Heteroptera.*

In fact the entomologists of Honolulu, members of the Hawaiian Entomological Society, or those engaged officially in entomological work of one kind or another chiefly with reference to economic or practical work with insect pests at one or another of the different institutions, are interested in many of the lines of research above indicated, and have spent much time on some of them, and are continuing to do so as time and opportunity presents. But in this way progress must needs be slow as compared with a research worker putting his whole time and attention on a special subject, without other duties to continually interrupt or interfere with his progress.

2. *Collecting.*

For most of the lines above mentioned, much collecting is necesssary, not only in general throughout the Islands, but in special places where no collecting has been done, particularly in localities where the native forests are rapidly on the decline and are disappearing, and this can best be done by persons trained in the special methods of insect collecting in these Islands, to obtain results, and capable of taking the desired notes and data as to host, location, other conditions, etc.

3. *Systematic Entomology.*

This line of work must go hand in hand with biological researches. It involves: descriptions of new species; revisions of groups; production of synoptic tables, etc. Many of the members of the Entomological Society are having a share in this already.

4. *Bearing on Factors of Evolution.*

Many of the biological problems are of great importance on

account of the bearing they have on the factors of evolution, and should be carried on with these points in mind.

The present economic entomologists should by all means be encouraged to continue with the lines of research they are interested in and now following; but an efficient entomological staff at the Museum would be in position to carry on many lines of research to advantage which cannot be satisfactorily handled by the other entomologists.

Reference Collection of Hawaiian Insects.

It is only natural that a subject of such consuming interest to the active workers in entomology here, as the entomological policy of the Bishop Museum, should receive further thought and deliberation, and we find ourselves at present, after the lapse of six months, burdened with many suggestions of a specific nature on the means of accomplishing the work outlined. Regarding a "Reference Collection of Hawaiian Insects," we desire to state our absolute conviction that nothing of importance can be accomplished in the way of building up such a collection of Hawaiian insects until a competent, trustworthy and permanent curator of insects is appointed. Only a competent man can do the work well, and the labor involved would require his entire time for many years. It has been stated before that there are "types" and series of specimens of endemic as well as introduced insects ready for the Museum when a competent and trustworthy custodian is provided and liberal regulation of their use admitted.

It has also been pointed out that the Museum now has representatives of sixty-four per cent of the species of Hawaiian insects known and listed at the time the Fauna Hawaiiensis was published. These are virtually "types," being actual specimens in hand when the descriptions were made. With so large a proportion already possessed a complete representation seems eminently desirable, and its importance to workers here, who are desirous of carrying on the labors of Blackburn, Perkins, Kirkaldy and others, cannot be over-stated. It is impossible for most of us to go as far as London to examine the "types"

unrepresented here, yet thorough descriptive work cannot be done without seeing them. Apparently undescribed species are constantly being discovered as the result of intensive collecting, which should be published. Also many groups of Hawaiian insects need revison badly and the material is at hand for the work. The Museum could foster work of this kind by offering to finance the study of the "types" by specialists undertaking descriptive or revisory work, receiving in return for the outlay, the manuscripts for publication and insect material, including "types," specimens compared with "types," and series of specimens for reference to build up the collections. Some of this work could undoubtedly be undertaken by the curator.

When the further entomological exploration of the Pacific, now in contemplation, begins to secure results, if, as this Society has strongly urged, the material obtained is turned over to the Museum, the need for this advanced organization of its entomological work will become more imperative and indeed, this work should not otherwise be undertaken.

The Entomological Exploration of the Pacific.

In view of the plans now under consideration for the further scientific exploration of the South Pacific by means of an exploring voyage in the near future, the Hawaiian Entomological Society has felt it could be of assistance by a formulation of its experience and its conception of the methods by which the work in its own field may best be carried out. In the fifteen years of its existence there has been developed among its membership a lively interest in the wider entomological problems of the Pacific and the discussions of these matters have resulted in the crystallization of definite ideas among its members, probably based upon a broader experience of Pacific, and particularly Polynesian, entomology than can be found in any other body of scientific men.

The broad purpose of the scientific exploration now in contemplation is doubtless to secure material upon which to

base a well grounded opinion in regard to the supposed former existence of a Pacific continent and thus to secure further evidence upon the question of the permanence of the continents and oceans, and, if there may be considered to have been such a Pacific continent, to find its former extent and its relations to the surrounding continental areas, its antiquity, the origin of its fauna and flora, and the extent of divergence in the various groups, and to trace as far as it may be done, the history of the human race in the Pacific. To the broad purpose of the exploration and to the subordinate ends, we feel that an adequate entomological exploration will contribute largely. The richness and diversity of any insect fauna in comparison with that of other phases of land animals and its greater persistence under conditions leading to the extinction of the larger forms of animal life, tends to make the conclusions drawn from it less subject to accidental errors. We believe that the biological evidence in regard to these problems must rest primarily upon a thorough knowledge of the phanerogamic flora, the land shells and the insects of the regions to be explored.

How this knowledge of the insect fauna may best be secured is indicated by the work done in the past. Few, if any, of the great explorations in the Pacific have made any considerable contribution to our knowledge of the insect fauna, and today the only group of islands in the Pacific where this fauna is at all adequately known is our own group where the Committee of the Royal Society and the British Association hit upon the method by which an insect fauna may be made known. It was by the selection of such an extremely capable entomological naturalist as Dr. Perkins and by keeping him long enough upon the ground to do the work that the truly remarkable results embodied in the Fauna Hawaiiensis were secured.

In the opinion of this Society, the adequate entomological exploration of the Pacific from the standpoint of the problems stated and the particular phase of the relation of the Hawaiian

insect fauna to that of the South Pacific, requires the exploration of certain islands or groups of islands. Those which seem to us most important are these: The Galopagos, San Juan Fernandez, Easter Island, some of the low eastern coral islands such as the Paumotus, the Marquesas, Tahiti, Samoa, the Fijis, and some of the low western coral islands, probably the Marshall Islands. Aside from these the Bonin Islands are known to have some curious biological relations which make their exploration desirable and the insect fauna of New Zealand, other than the beetle fauna is in great need of further exploration. The island groups between Fiji and New Guinea, while of very great interest, are so obviously related entomologically to New Guinea that their exploration would fall into relation with the exploration of that region rather than with the region which we have under consideration.

The Galopagos Islands are generally supposed to have been more or less thoroughly explored entomologically but in discussing the matter with Dr. F. X. Williams, who did the entomological work for the California Academy of Sciences Expedition, we learn that he considers that less than fifty per cent of the Galopagos insect fauna is known and that more intense collecting, particularly in the upland forest, which has proved to have so many peculiar and interesting forms in the Hawaiian Islands, is much to be desired.

While an exploring voyage such as is being planned at present, may, under proper arrangements, secure results of inestimable value in planning the future work of exploration, it will be a most deplorable mistake to suppose that it will be possible, under the conditions of such a voyage at its very best, to make an adequate entomological exploration of any but the smallest of the islands and then only if there are other matters of importance which are likely to lead to a considerable time being spent there. The only way in which the explorations may secure materials upon which any well based opinions can be founded, is to place a well trained man on the ground for a period of not less than one year and in all probability for a

longer period. If his work can be done simultaneously with botanical explorations, much will be gained, for the most effective entomological work in these regions calls for an intimate knowledge of the flora which can hardly be expected from an entomologist working alone.

Judging from our experience here, even the best collector of insects from the temperate regions needs a complete reeducation in methods of work before he can work in such regions as those to be explored, for it may be expected that the insects there, as they are in Hawaii, will be found closely attached to the endemic or native plants and one unfamiliar with the hundreds of tropicopolitan plants will waste much of his time on these plants, when one familiar with conditions would be doing significant work. It seems to be of the greatest importance that there should be secured, if possible, for the work with the proposed expedition and in the necessary subsequent work, someone who has had experience in collecting in the Hawaiian Islands and is already somewhat familiar with the special methods of collecting which have been developed here, and with the special problems of the Pacific.

We have already expressed ourselves as of the opinion that such future explorations of the entomology of the Pacific should be centered in the Bishop Museum of Honolulu and we believe the material secured should be placed there and studied under the administration of the curator of insects when that position is filled. With the proper organization of this work, in that institution, it is probable that these explorations will arouse a continuing interest in this work among residents of the various island groups and will result in further material being made available for study when they know where such material can be sent.

C. L. Crawford,
W. M. Giffard,
O. H. Swezey,
J. C. Bridwell,
D. T. Fullaway,
Committee.

Immigrant Records for 1919.

BY THE EDITOR.

During the year 1919, 25 immigrant insects were recorded for the first time. Some of them have evidently been present for several years without having been noticed. None of them are of much economic importance, not being considered as pests at present. Several of them are parasites or predators, hence to be considered beneficial. Of some of them the habits are not yet known. A list is here given with the pages on which the records occur.

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PRESS OF THE PACIFIC, HONOLULU